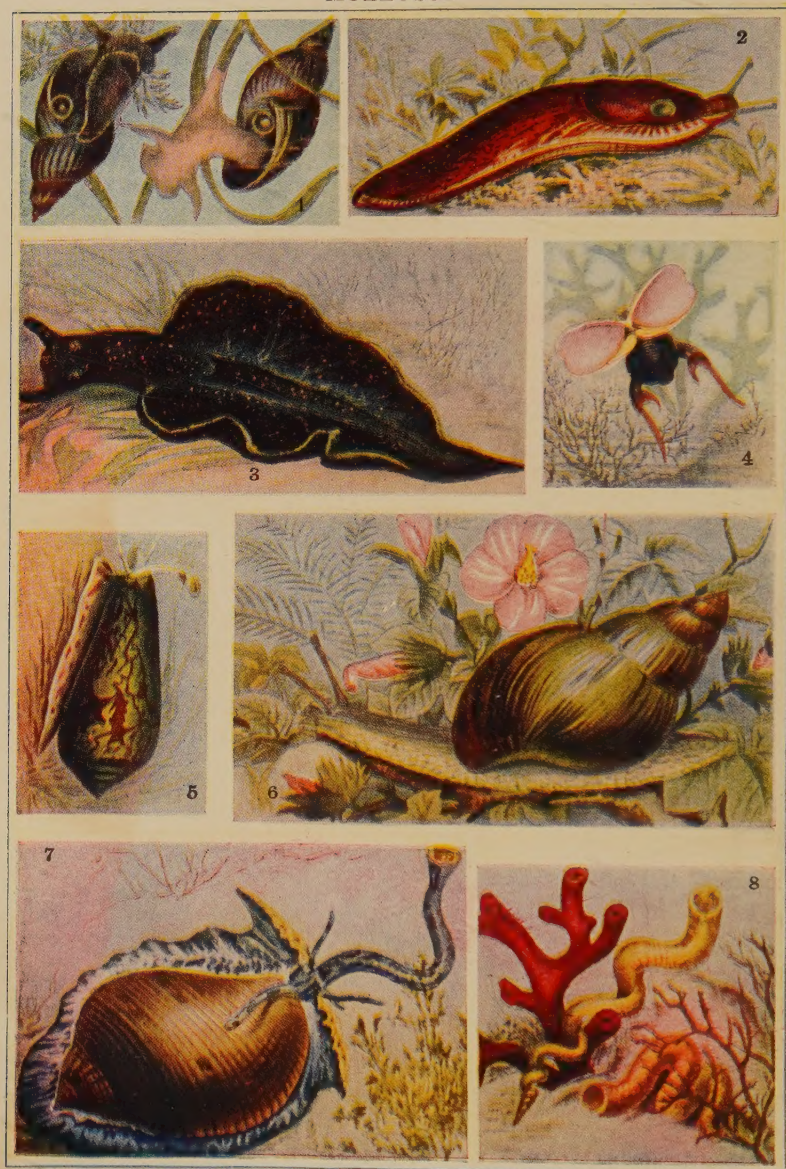

1. Pond Snail (Limnea stagnalis). 2. Slug (Arion empiricum). 3. Green Sea-Slug (Elysia viridis). 4. Pteropod (Hyalea tridentata). 5. Cone-shell (Conus textilis). 6. Achatina (Achatina mauritanica). 7. Tun-shell (Dolium galea). 8. Wormshell (Vermetus gigas).

THE UNITED EDITORS PERPETUAL ENCYCLOPEDIA

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SCHEME OF SOUND SYMBOLS

FOR THE PRONUNCIATION OF WORDS.

Note.—(·) is the mark dividing words respelt phonetically into syllables; (′), the accent indicating on which syllable or syllables the accent or stress of the voice is to be placed.

Sound-symbols employed in Respelling.	Representing the Sounds as exemplified in the Words.	Words respelt with Sound-symbols and Marks for Pronunciation.
ā	mate, fate, fail, aye	*māt, fāt, fāl, ā.*
ă	mat, fat	*măt, făt.*
â	far, calm, father	*fâr, kâm, fâ′thėr.*
ä	care, fair	*cär, fär.*
aw	fall, laud, law	*fawl, lawd, law.*
ē	mete, meat, feet, free	*mēt, mēt, fēt, frē.*
ĕ	met, bed	*mĕt, bĕd.*
ė	her, stir, heard, cur	*hėr, stėr, hėrd, kėr.*
ī	pine, ply, height	*pīn, plī, hīt.*
ĭ	pin, nymph, ability	*pĭn, nĭmf, ă-bĭl′ĭ-tĭ.*
ō	note, toll, soul	*nōt, tōl, sōl.*
ŏ	not, plot	*nŏt, plŏt.*
ô	move, smooth	*môv, smôth.*
ö	Goethe (similar to *e* in her)	*gö′téh.*
ow	noun, bough, cow	*nown, bow, kow.*
oy	boy, boil	*boy, boyl.*
ū	pure, dew, few	*pūr, dū, fū.*
ŭ	bud, come, tough	*bŭd, kŭm, tŭf.*
ů	full, push, good	*fůl, půsh, gůd.*
ü	French plume, Scotch guid	*plüm, güd.*
ch	chair, match	*chär, măch.*
ċh	German buch, Heidelberg, Scotch loch (guttural)	*bôċh, hī′dėl-bėrċh, lŏċh.*
g	game, go, gun	*gām, gō, gŭn.*
j	judge, gem, gin	*jŭj, jėm, jĭn.*
k	king, cat, cot, cut	*kĭng, kăt, kŏt, kŭt.*
s	sit, scene, cell, city, cypress	*sĭt, sēn, sĕl, sĭt′ĭ, sī′prės.*
sh	shun, ambition	*shŭn, ăm-bĭsh′ŭn.*
th	thing, breath	*thĭng, brĕth.*
th̄	though, breathe	*th̄ō, brēth̄.*
z	zeal, maze, muse	*zēl, māz, mūz.*
zh	azure, vision	*ăzh′ėr, vĭzh′ŭn.*

UNITED EDITORS' ENCYCLOPEDIA AND DICTIONARY.

MER'CURY AND MERCU'RIALS, MEDICINAL USES OF: applications important and various. Liquid mercury is no longer used in medicine, though, until lately, it was occasionally given with the view of overcoming, by its weight, obstructions in the intestinal canal. There are, however, many preparations which owe their value to *extinguished* mercury; that is to say, to mercury triturated with chalk, saccharoid matters, oil, etc., till globules can no longer be detected in it. It is possible that, in these cases, the metal is partly reduced to the state of suboxide. Among these preparations are—*Mercury with Chalk*, or *Gray Powder* (*Hydrargyrum cum Cretâ*), the mildest and best mercurial to administer to infants and children, the dose varying with the age; *Blue Pill* (q.v.); and the various ointments, liniments, and plasters of mercury. *Calomel* (termed in some of the pharmacopœias, *Hydrargyri Chloridum*, for the same reason that corrosive sublimate, as above mentioned, is termed in the same works *Hydrargyri Bichloridum*) has been perhaps more given than any other medicine of this class, though now less frequently used, and may be regarded, so far as its action is concerned, a type of mercurials generally. Given in small doses, the first effects of these medicines are observed in the increase of the various secretions, e. g. of the saliva (see SALIVATION), of the various fluids poured into the intestinal canal, and sometimes of the urine. When continued in small doses for some time, they cause the absorption of morbid fluids, and even of morbid products that have assumed a partially solid form. The following are some of the diseases in which they are of most importance: (1), In *internal congestions*, as of the liver, etc., to increase the secretions, and hence relieve the vessels of the affected organ; (2), in various *acute inflammations*, especially of serous mem-

branes (q.v.), of the structure of the liver and of the lungs, etc.; (3), in numerous forms of *chronic inflammation;* (4), in *dropsies*, dependent on inflammation of serous membranes or disease of the liver, but not in dropsy from disease of the kidneys, where these medicines are generally injurious; (5), in numerous *chronic affections* in which an alterative action is required; and (6) as a purgative (to be followed by a black draught), when a patient is in the condition popularly known as bilious (in this case blue pill is usually as efficacious as calomel).

In *syphilis*, mercurials were formerly universally prescribed; now they are not considered essential to the cure, except in comparatively few cases.

If calomel, blue pill, or any other mercurial be given in too large a dose, or for too long a period, most serious consequences may result—such as, very profuse salivation, with swelling of the tongue and gums, and loosening of the teeth; purging; certain skin affections; disease of the periosteum and of the bones (formerly ascribed to syphilis, but in reality due oftener to the supposed remedy); and a low, febrile condition (termed mercurial erythism), accompanied with great general prostration.

The doses of calomel for an adult vary from 3 to 6 grains when taken as a purgative. If the object is to affect the system generally, as in the case of acute inflammation, small doses (half a grain to two grains, combined with a little opium) should be given several times a day; while as an alterative, still smaller doses (not sufficient at all to affect the mouth) should be prescribed. The *Compound Calomel Pill* popularly known as *Plummer's Pill* (in which the calomel is associated with oxysulphide of antimony and guaiacum) is a most valuable alterative in chronic skin-diseases—a five-grain pill to be taken every night.

Corrosive sublimate (the *Bichloride* of the pharmacopœias, and *Oxymuriate* of the older chemists), though a very powerful irritant poison, is extremely useful in very minute doses as an alterative in many chronic affections of the nervous system, the skin, etc. The dose varies from one-thirtieth to one-eighth of a grain; the average dose of its pharmacopœial solution, the *Liquor Hydrargyri Bichloridi*, being one drachm, which contains one-sixteenth of a grain of the salt. This medicine should never be given on an empty stomach.

The above are the chief mercurial preparations given internally. Certain external applications require a few remarks. The plasters, ointments, and liniments are absorbed by the skin, and act in the same manner as mercurials taken internally.

White Precipitate Ointment is the universal application for destruction of lice; and is a useful stimulating application in chronic skin-diseases. *Ointment of Nitrate of Mercury*, popularly known from its yellow color as *Citrine*, or *Golden Ointment*, is, when sufficiently diluted, a most useful stimulating application in inflammation

of the eyelids, in indolent ulcers, etc.; and the *Ointment of Nitric Oxide of Mercury* is similar in its action. For the precipitated suboxide that occurs in *Black Wash*, and its use as a local application, see LINIMENT.

The *toxicological* relations of the mercurial compounds must be briefly glanced at. There are cases on record in which, probably from some peculiarity of constitution, ordinary and even small doses of the milder mercurials have caused death; thus, Christison mentions a case in which two grains of calomel destroyed life by severe salivation and by ulceration of the throat; and similar cases in which small doses of gray powder, blue pill, and calomel have proved fatal, are recorded by Taylor in *Medical Jurisprudence*. The preparations used for poisoning are mainly corrosive sublimate, and white and red precipitates, corrosive sublimate being used in at least four-fifths of the cases. The symptoms produced by a poisonous dose of this salt come on immediately, there being during the act of swallowing an intense feeling of constriction, and a burning heat in the throat, while a metallic taste is left in the mouth. Violent pain in the stomach and abdomen is felt in a few minutes, and vomiting of mucus and blood, and purging follow. The pulse becomes small, frequent, and irregular, the tongue white and shrivelled, the skin cold and clammy, the respiration difficult, and death is preceded by fainting or convulsions. Any dose exceeding two grains would probably prove fatal to an adult, unless vomiting were promptly induced, or the whites of eggs administered. Death ensues usually in from one to five days, but may take place in less than half an hour, or not for three weeks or more.

MERCY, n. *mĕr′sĭ* [F. *merci*, a benefit or favor, pardon; It. *mercede*, reward, mercy—from L. *mercēs* or *mercēdem*, earnings, desert]: the act of sparing; pity; compassion; willingness to spare and save; clemency; pardon. MER′CIFUL, a. *-sĭ-fŭl*, compassionate; tender; humane; willing to pity and spare. MER′CIFULLY, ad. *-lĭ*. MER′CIFULNESS, n. *-nĕs*, tenderness; willingness to spare; readiness to forgive. MER′CILESS, a. *-sĭ-lĕs*, without mercy; hard-hearted; cruel; unsparing. MER′CILESSLY, ad. *-lĭ*. MER′CILESSNESS, n. *-nĕs*, want of mercy or pity. MERCY-SEAT, the covering of the ark of the covenant among the Jews; God's throne. TO BE AT THE MERCY OF, to be wholly in the power of; to have no means of defense or safety. SISTERS OF MERCY, or *Order of our Lady of Mercy*, religious order of women in the Rom. Cath. Chh., founded in Dublin, A.D. 1827, who devote themselves to the succor and protection of the sick and destitute, and to visit hospitals and prisons (see SISTERHOODS).—SYN. of 'merciful': gracious; kind; mild; benignant; clement—of 'merciless': unmerciful; unfeeling; severe; barbarous; savage; remorseless; ruthless; pitiless;—of 'mercy': leniency; commiseration; sympathy; condolence; grace; tenderness; mildness.

MERCY, FATHERS OF: Roman Catholic religious congregation founded on the restoration of Louis XVIII., 1814, and approved of by the Pope (1834) under the title 'Society of the Priests of Mercy.' The object of the society is the conversion of sinners by mission preaching, and the practice of the corporal works of mercy. In 1839, the order founded houses in New York and Saint Augustine, Fla., and the fathers have churches for the French population in Brooklyn and Manhattan. The mother house was originally at Paris, but was removed to Rome in 1903 as a result of the Association Law. Consult: Delaporte, *Vie de Jean-Baptiste Rauzan* (1857).

MERCY-SEAT (Heb. *Kappo'reth*, covering or lid, that is, of the sacred ark in the ancient Jewish tabernacle): an unfortunate and inappropriate term as applied to the cover of the chest or ark containing the two tables of the law, and overspread by the wings of the Cherubim. Between these wings appeared the Shekinah or fiery symbol of the divine presence hovering over the mercy-seat, which consisted most probably of a sheet of the finest gold (Ex. xxv. 17, etc.; xxx. 6; xxxi. 7, etc.). The New Testament writers seem to hold that the term contains by implication the idea of the propitiation (q.v.) (Heb. ix. 5; Rom. iii. 24). The high priest sprinkled on it the blood of the yearly atonement, and some writers think that the term covering as applied to it refers more to the covering of or atonement for sins than to its use in covering the treasures of the ark. In any case the idea of a seat, as if the expression in Psalms xcix. 1, 'he sitteth between the cherubims,' referred to the earthly tabernacle, is inappropriate. Consult: Pratenias, *De Judæa Arca* (1727); Werner, *De Propitiatoria* (1695).

MERCY, SISTERS OF: a name given to members of several religious communities founded for the purpose of nursing the sick at their own homes, visiting prisoners, attending lying-in hospitals, superintending the education of females, and the performance of similar works of charity and mercy. Communities of Sisters of Mercy are now widely distributed over Europe and America. There are communities under the same name connected with the Anglican Church. The term is applied more specifically to the Order of Our Lady of Mercy, a Roman Catholic order founded for the objects above enumerated in Dublin 1827. The first house in America was established in Pittsburg, Pa., 1843, and from it have sprung 65 convents. Consult: *Leaves from the Annals of the Sisters of Mercy* (1881). See MCAULEY, CATHERINE.

MER DE GLACE: France, an Alpine glacier on the northern slope of Mont Blanc, with an area of 16 square miles, and an extreme length of about nine miles. It is formed by the confluence of three branches called the Glacier du Géant, the Glacier du Lechaud, and the Glacier du Talèfre, and is noted for its beautiful scenery. It

ends as the Glacier des Bois, whence flows the Arveyron river, in the valley of Chamouni. From the village of Chamouni the Mer de Glace is easiest visited and Mont Blanc ascended. The glacier has an average flow of two feet a day during summer and autumn.

MERE, a. *mēr* [L. *merus;* It. *mero,* alone, unmixed: Dut. *maar,* only, no more than: comp. Gr. *meros,* a part —from *meiro,* I divide]: this or that only; distinct from anything else; simple; absolute. MERE'LY, ad. *-lĭ,* simply; solely; 'n *OE.,* absolutely; utterly; entirely.—SYN. of 'merely': barely; wholly; purely; hardly; scarcely; unmixedly.

MERE, n. *mēr* [F. *mare;* Dut. *maer,* a pool: mid. L. *mara,* water generally: Ger. *meer;* Icel. *marr;* W. *môr;* Gael. *muir;* L. *mārĕ,* the sea]: a pool or lake.

MER'EDITH, GEORGE: English novelist and poet: b. Hampshire, Eng., 1828, Feb. 12. He was educated in Germany, and prepared himself for the legal profession, but early entered on a literary career, publishing (1851) a vol. of poems, (1855) a prose burlesque, *The Shaving of Shagpat,* and (1857) *Farina,* a legend of Cologne. A philosophical novel, *The Ordeal of Richard Feverel,* first brought him prominently before the public as a thoughtful and serious writer of great power. *Evan Harrington,* a social comedy, was published in 1861; *Modern Love,* poems and ballads (1862); *Emilia in England* (1864); *Rhoda Fleming* (1865); *Vittoria,* sequel of *Emilia in England* (1866); *The Adventures of Harry Richmond* (1871); *The Egoist* (1879); *The Tragic Comedians* (1881), a novel founded on the life and tragic death of the German socialist, Ferdinand Lasalle; *Poems and Lyrics of the Joy of Earth* (1883); *Diana of the Crossways* (1885); *Ballads and Poems of Tragic Life* (1887); *A Reading of Earth* (1888). *One of Our Conquerors,* a novel, was published 1890; *Lord Ormont and His Aminta* (1894); and *The Amazing Marriage* (1895). A vol. of poems, *The Empty Purse,* appeared 1892. Other works by him are: *Jump to Glory Jane* (1892); *The Tale of Chloe; The House on the Beach; The Case of General Ople and Lady Camper* (1895); *Comedy, and the Uses of the Comic Spirit* (1897); *Selected Poems* (1900); etc.

MEREDITH, LOUISA ANNE TWAMLY: Australian author and artist: b. Birmingham, England, 1812, July 20; d. Hobart Town, Tasmania, 1895, Oct. 21. She had already published a volume of verse (1835); and *The Romance of Nature,* illustrated by herself (1836), before she married her cousin, Charles Meredith (1839), and removed to Australia, whence they went to Tasmania five years later. She continued her literary activity till the end of her long life, and for many years before her death had been the most prominent Tasmanian author. Among her many books, often illustrated by herself, are: *My Home in Tasmania* (1852); *Over the Straits* (1860);

Tasmania: Friends and Foes, Feathered and Furred (1880).

MER'EDITH, OWEN. See LYTTON, EDWARD ROBERT, Earl.

MEREDITH, *mĕr'ē-dĭth,* SAMUEL: 1740—1817, Mar. 10; b. Philadelphia; son of a Welshman who was a friend of Washington. Meredith became a member of the Penn. colonial legislature; and when the American revolution broke out, he entered the colonial army as major, took part in several battles, and was made brigadier-general for gallant services. He gave £10,000 in silver for carrying on the war; and was exiled from Philadelphia when the British occupied it; 1787-88, he served in congress; 1789-1801, he was the first treasurer of the United States, advancing to the government, on taking the office, $20,000 and later $120,000, for which he was never reimbursed. He died at Belmont, Luzerne county, Penn.

MER'EDITH, WILLIAM MORRIS, LL.D.: 1799—1873, Aug. 17; b. Philadelphia. He graduated at the Univ. of Pennsylvania 1812; studied law; and, 1820, began practice. 1824-28, he served in the legislature; 1834-49, was president of the Philadelphia select council; 1837, served as a member of the Penn. constitutional convention; 1849, was made secretary of the U. S. treasury, and held the office until President Taylor's death 1850. He was attorney-general of Penn. 1861-67; and president of the state constitutional convention 1873. He was constantly employed on important cases before the supreme court; and, 1871, was offered, but declined, the position of counsel for the United States at the Geneva conference on the Alabama question.

MEREDITH, SIR WILLIAM RALPH, LL.B., LL.D.: Canadian jurist: 1840, Mar. 31; b. Westminster, Ont. He was educated in the University of Toronto and was admitted to the bar in 1861, when he established a law practice in London, Ont. He was a member of the Ontario legislature 1872-94 and became queen's counsel in 1876. In 1894, he was appointed chief justice of the Court of Common Pleas, which office he still holds, and he is chancellor of the University of Toronto. He was knighted in 1896.

MERENCHYMA, n. *mĕr-ĕng'kĭ-mă* [Gr. *meris,* a part, a particle; *engchŭma,* what is poured in, the substance of organs—from *engchŭō,* I infuse]: in *bot.,* tissue composed of rounded cells.

MERETRICIOUS, n. *mĕr'ĕ-trĭsh'ŭs* [L. *meretrīciŭs,* pertaining to a harlot—from *merĕtrix,* a harlot]: that is practiced by harlots; alluring by false show; having a gaudy but deceitful appearance. MER'ETRI'CIOUSLY, ad. *-lĭ.* MER'ETRI'CIOUSNESS, n. *-nĕs,* the quality of being meretricious.

MERGANSER, n. *mĕr-găn'sĕr* [Sp. *mergansar*—from Sp. *mergo;* L. *mergus,* a diver or gull—from L. *mĕrgo,* I

dip, I dive: Sp. *ansar;* L. *anser,* a goose]. (*Merginæ*): sub-family of birds of family *Anatidæ,* having a slender, straight, much compressed bill, hooked at the tip, and notched at the edges, almost furnished with teeth. All these species of ducks are inhabitants of the seas and coasts of n. regions, but migrate southward in winter. The Goosander (q.v.) is the largest and best known of the species. The RED-BREASTED MERGANSER (*M. serrator*) is found in all the n. parts of the world. It is not much smaller than the goosander, which it much resembles.—The HOODED MERGANSER (*M. cucullatus*), a smaller species, only about 18 inches in entire length, is very plentiful in N. America.

MERGE, v. *mėrj* [L. *mergĕrĕ,* to dip or plunge under water: It. *mergere*]: to sink; to cause to be swallowed up; to be swallowed up or lost. MERG'ING, imp. MERGED, pp. *mėrjd.*

MERGENTHALER, *mĕr'gan-tâ-lėr,* OTTMAR: American inventor: b. Würtemberg, Germany, 1854, May 10; d. Baltimore, 1899, Oct. 28. He was a watchmaker by trade; came to the United States at 18; entered the employ of the United States government at Washington, where he kept clocks and electrical bells throughout government buildings in order; improved apparatus used in the signal service; and in 1876 removed to Baltimore, where he devoted himself to perfecting a type-setting machine. On this he spent several years, his scheme going through four stages, the last of which was the linotype (q.v.). When he had patented this machine he had much difficulty in introducing it. It was perfected by the addition of the Rogers spacer, brought its inventor large profits, and is now in very common use in large printing establishments. Mergenthaler also invented a basket-making machine.

MERGER, *mėrj'ėr,* in Law: extinguishment of a right by reason of its coinciding in the same person with another right of higher value in the estimation of law: and this may take place with or without the intention of the parties. The less right ceases to exist, but the greater right is not increased by the union. A merger may arise either of rights or of estates.

When a person acquires security of a higher value in the law than that which he possesses for a right or cause of action, his remedies are merged into those attaching to the greater security. Thus if a bond is given for a simple contract debt, the right of action for the contract indebtedness ceases, and an action must be brought on the bond; or if one sues another on his promise or indebtedness of any kind or for a wrong of any kind, and recovers a judgment, the original cause of action merges or is lost in the judgment.

Merger in estates takes place when a less and a greater estate meet in the same person without an intervening

estate; thus a mortgage will become merged in a deed, when the owner of the mortgage becomes the owner of the mortgaged property, and this merger is regarded as a payment of the mortgage debt; or if an estate in fee descends to a person owning the life estate, the life estate is merged in the fee and ceases to exist. In order that a merger of estates shall take place, the estates must be in the same property, must meet in the same person at the same time, and one estate must be inferior to the other as a matter of law, though perhaps not as a matter of fact. Thus an estate for a term of years, however many, would merge in an estate for life, which is necessarily of a limited number of years; an estate for life being in law a greater estate than an estate for a term of years. Where there is union of a legal and equitable estate in one person, the equitable or trust estate is extinguished, being merged in the legal estate; e.g., when a person for whom an estate is held in trust becomes the legal owner of the estate, the trust ceases, and the legal estate remains freed of the trust.

In criminal law a less offense will be merged in a greater offense committed by the same person; thus a murder committed by blows will include the assault and battery; but when the offenses are of equal degree no merger will take place. The law that when a person commits a crime that involves a wrong against some private person, the private wrong is merged in the crime, is generally abolished; so that the person committing the crime is now civilly responsible to the person whom he has wronged.

MERGUI' ARCHIPEL'AGO: group of 207 islands in the Gulf of Bengal, off the s. shores of the Tenasserim Provinces, lat. 9° to 13° n. The islands are mountainous, some rising 3,000 ft. above sea-level. Pearls are found on the coasts of many of them; and edible birds'-nests, which are sold to the Chinese and Malays, as also timber and coal, are among chief articles of export.

MERICARP, n. *mĕr'ĭ-kârp* [Gr. *meris*, a part; *karpos*, fruit]: the half of the fruit of an umbelliferous plant, like the hemlock.

MERIDA: former name of Los Andes, state in n.w. Venezuela; bounded n. by Zulia (Maracaybo), e. by Truxillo and Barinas, s. by Barinas and the United States of Colombia, w. by Pampnora; 10,000 sq.m.; cap. Merida. The surface consists of elevated table-lands and valleys, spurs of the Andes Mts. traversing it in all directions; it has 31 peaks over 10,000 ft. high; one, belonging to the Sierra Nevada range, being 15,066 ft. in height. The Grita, navigable 50 m. from its junction with the Zulia, is the largest of its numerous rivers. There are a number of considerable lakes, that of Lagunilla, 3,000 ft. above sea-level, yields quantities of sesquicarbonate of soda. Its productions are those common to the torrid and temperate zones. Pop. about 350,000.

ME'RIDA: town of Venezuela, S. Amer., cap. of state of Los Andes, about 60 m. s. of the Lake of Maracaybo. It was formerly the largest and one of the most important cities of Venezuela; but in 1812 it was almost wholly destroyed by an earthquake, from which misfortune it has somewhat recovered, and is again flourishing. Pop. about 12,000.

MERIDA, *mĕr'ē-thâ* (anc. *Augusta Emerita*): small, decayed town of Spain, province of Estremadura, on the right bank of the Guadiana, 32 m. e. of Badajoz. It is unique in Spain, and is in some points a rival of Rome itself, on account of the number and magnitude of its remains of Roman antiquity. The Guadiana is here crossed by a Roman bridge of 81 arches, and with a length of 2,575 ft., and a breadth of 26 ft.; it was erected by Trajan. There is another Roman bridge over the Albarregas, 450 ft. long, 25 ft. wide, still quite perfect, in spite of the traffic of 17 centuries. There are also remains of a castle built by the Romans; and among other most noteworthy monuments of antiquity are an old half-Roman, half-Moorish palace, the Casa de los Corvos, constructed out of a temple dedicated to Diana, several aqueducts, an ancient theatre, and a circus. Merida was built B.C. 23, and flourished in great splendor, until, 1228, it was taken from the Moors, after which it began to decline. Pop. 7,390.

MERIDA, *mĕr'ē-dâ* or *mĕr'ē-thâ:* city, cap. of Yucatan, Mexico. The city was founded in 1542, and is situated on a level plain but little above sea level. There are railway connections with all important points in the interior, and several lines of steamers ply between Progreso, 25 miles distant, and Veracruz, New York, and other prominent commercial ports. The surrounding country is almost entirely devoted to the henequen industry, which has reached enormous proportions in the state. There are manufactories of cotton goods, cigars, panama hats, leather, soap, etc., and considerable trade in sisal hemp. The principal buildings are the government palace, the municipal palace, the Casa del Conquistador Montejo (the first Spanish house built in the city), the old Cathedral, the School of Arts, the Penitentiary, Literary Institute or State College, Normal School for Teachers, Meteorological and Astronomical Observatory, Yucatan Museum, Catholic College of San Ildefonso, schools of medicine, surgery, pharmacy, jurisprudence, and notarial instruction; the Literary Institute for Girls, the College for Girls, the Catholic School for Girls, the Tereseano College, the Primary School of Arts and Works, and the Institucion de Beneficiencia Privado, founded by Leandro L. Ayala at an outlay of $1,000,000. There are an Asylum for Maniacs, a Lazareto, a Maternity Hospital, three other hospitals, an Asylum for Mendigos, two theatres, and an arena for bull fights. The Hidalgo Park contains a statue of General Cepeda Peraza; and one

symbolizing the peace of the state. Near the great Cathedral are also large statues of Saint Peter and Saint Paul. A Body of Public Security, a Jefe Politico and an Inspector General preserve order and insure safety to all. The streets are paved with asphalt. Merida contains two local financial institutions—the Banco Yucateca, with a capital of $8,000,000, and the Banco Mercantil de Yucatan, with a capital of $6,000,000, and a branch of the National Bank and an agency of the Bank of London and Mexico. Pop. about 42,000.

MER'IDEN, *mĕr'ĭ-dĕn:* Conn., city, in New Haven county; on branches of the New York, New Haven & Hartford railroad; about midway between Hartford and New Haven. Originally the town of Meriden was a part of Wallingford until 1806, when the town of Meriden was incorporated. In 1867, it was granted a city charter. It is situated in an agricultural region, but the city is noted for its large number of manufactories. Some of the principal manufactures are cutlery, silver and plated ware, steel pens, hardware, machinery, screws, vises, glassware, cut glass, malleable iron, bronzes, firearms, brass castings, curtain fixtures, gas and kerosene fixtures, self-playing attachments for pianos and organs, woodenware, tinware, granite, agate-ware, lamp trimmings, etc. The shipments are principally manufactured articles, fruit, vegetables, and tobacco.

The educational institutions are the public and parish schools, a high school and the Curtis Memorial Library. It has the Curtis Home for Orphan Children and Aged Women, the Connecticut School for Boys, and the Meriden Hospital. Lake Merimere, a beautiful body of water, is near, and another attraction is Hubbard Park, area 900 acres, within which are the Hanging Hills, peculiar elevations which are from 100 to 1,000 feet above sea-level. The government is administered under a charter of 1897. The mayor, who holds office two years, appoints fire and park commissioners, board of taxation and apportionment, police and board of public works. The council elects the health officer, board of compensation, tax collector, plumbing inspector, boiler inspector and fire marshal. The treasurer, sheriff, clerk, and auditor are chosen by popular vote. Pop. (1900) 24,296.

MERIDIAN, n. *mĕ-rĭd'ĭ-ăn* [F. *méridien,* circle in astronomy—from L. *meridiānus,* belonging to midday—from *meridīēs,* midday—from *mĕdĭŭs,* middle; *dĭēs,* day]: midday or noon: thence the highest point of anything; culmination, as of life or of fame. Meridian is applied technically in geog. (*Terrestrial Meridian*) and in astron. (*Celestial Meridian*), denoting the imaginary great circle of the celestial sphere which passes through both poles of the heavens, and also through the zenith and nadir of any place on the earth's surface, cutting the equator at right angles: every place on the earth's surface has consequently its own meridian. The meridian is divided by

the polar axis into two equal portions, which stretch from pole to pole, one on each side of the earth. It is midday at any place on the earth's surface, when the centre of the sun comes upon the meridian of that place; at the same instant it is midday at all places under the same half of that meridian, and midnight at all places under the opposite half. All places under the same meridian have, therefore, the same longitude (see LATITUDE AND LONGITUDE); and the term meridian is applied to the brass ring surrounding a globe, on which the degrees are marked. Stars attain their greatest altitude when they come upon the meridian; the same thing is true approximately of the sun and planets; and, as at this point the effect of refraction upon these bodies is at a minimum, and their apparent motion is also more uniform, astronomers prefer to make their observations when the body is on the meridian. The inconvenience arising from having a fixed meridian in different countries is sufficiently obvious, and geographers, navigators, and astronomers have all found it frequently a source of confusion. After years of fruitless discussion the question of a reference or first meridian for the world came before an international conference held at Washington, 1884, Oct. 1 to 22. There, although the representatives of France and Brazil dissented, it was agreed to recommend the meridian of Greenwich both as the astronomical and as the geographical reference meridian of the world, longitude to be reckoned east and west from this up to 180°. At the same time it was advised that the astronomical day should begin at midnight, mean Greenwich time, the hours for astronomical purposes being reckoned as before from 0 to 24. This arrangement began on Jan. 1, 1885. Previously many foreign map-makers had accepted the meridian of Greenwich as first meridian, Germans and Americans apparently having no jealousy of Great Britain in regard to the matter. The change of time has had some importance for astronomers, but ordinary civil time is still computed much as before. The zone system of reckoning standard time was adopted in the United States in 1883 and in Australia in 1895. In the former country there are four zones: the Eastern, taking time from the meridian of 75° W. (5 hrs. slow on Greenwich time); the Central, with standard meridian 90° W. (6 hrs. slow); the Mountain, 105° W. (7 hrs. slow); and the Pacific, 120° W. (8 hrs. slow). There are three Australian zones: Queensland, New South Walés, Victoria, and Tasmania, with 150° E. (10 hrs. fast) as standard; South Australia, with 135° E. (9 hrs. fast); and Western Australia, with 120° E. (8 hrs. fast). Other standards adopted with reference to Greenwich are: 15° E. (1 hr. fast) for Mid-Europe; 22½° E. (1½ hrs. fast) for Cape Colony; 30° E. (2 hrs. fast) for Natal; 135° E. (9 hrs. fast) for Japan; and 172½° E. (11½ hrs. fast) for New Zealand. MERIDIAN, a. being on

the meridian or at midday; pertaining to the highest point. MERIDIONAL, a. *mē-rĭd'ĭ-ō-nal*, pertaining to the meridian; southerly; having a southern aspect. MERID'-IONALLY, ad. *-lĭ*.

MERID'IAN: Miss., city, county-seat of Lauderdale county; on the Mobile & Ohio, the New Orleans & North-eastern, and the Southern railroads; about 90 miles east of Jackson. Meridian is one of the oldest places in the state. It was a Confederate supply depot during the civil war until 1864, when it was attacked by General Sherman. From Feb. 14 until the 20th he destroyed the store houses, railroads, and took possession of the supplies. The city is surrounded by fine farm land on which a large quantity of cotton is raised. The chief industrial establishments are cottonseed-oil mills, cotton mills, lumber mills, railroad shops, cotton-gins and cotton compresses. Meridian is the trade centre for a considerable section of country; large shipments of cotton and lumber are made annually. It is the seat of the East Mississippi Female College (M. E.), founded in 1867 and opened in 1869. It has the Lincoln School (Congregational) and the Meridian Academy (Methodist Episcopal South), both for colored students. Pop. (1900) 14,050.

MERIDIAN CIRCLE: in astronomy, an instrument used in observatories to combine the functions of a transit instrument and of the old mural circle. A vertical circle is carried on the axis of the transit instrument and revolves with it, its divisions being read by micrometer microscopes mounted solidly on one of the piers. In this way both co-ordinates of the position of a heavenly body, its right ascension and declination, are determined at the same meridian passage—a great saving of time over the old method with the instruments.

MERIDIAN (Miss.), EXPEDITION TO: in 1864, Jan., Gen. Sherman concentrated two divisions of 10,000 each at Vicksburg under Gens. McPherson and Hurlbut, and Feb. 3 marched eastward with the purpose of destroying Meridian, 150 miles distant, as a railroad centre, and possibly penetrating to Selma, Ala., or, if the opposing forces did not seem too strong at Mobile, to turn southward from Meridian and attempt the capture of that city. Gen. Sooy Smith was to co-operate with a cavalry force from Memphis; Gen. Dodge, in command at Pulaski, Tenn., was to hold Logan at Bellefonte, Ala., for a diversion toward Rome, Ga.; and Gen. Thomas was to demonstrate toward Dalton to prevent troops being sent by Gen. Johnston to Sherman's front.

Sherman entered Jackson on the 6th, after heavy skirmishing with cavalry. Decatur was reached on the 12th. Sherman arranged to spend the night at a farm house. By mistake the regiment on guard had moved forward. The house was attacked, and just as Sherman, his clerks and orderlies were climbing into a cornerib at

the back of the house to defend themselves, the regiment which had gone on by mistake came rushing back and saved Sherman and his headquarters force from capture.

Meridian was taken the 14th, the Confederate force, under Gen. Leonidas Polk, being much less than Sherman's, withdrawing toward Demopolis. The arsenal, extensive storehouses, and cantonments were burned. The work of destroying the railroads centreing at Meridian began on the 16th, 60 miles being rendered utterly useless to the north and east, and 55 miles toward Mobile. This destruction was of the most systematic and thorough character; 10,000 men worked at it for five days; 61 bridges and culverts, and more than a mile of trestles over swamps were burned; all rails were rendered useless. This object of the expedition was fully gained, as Meridian was not wholly restored as a railroad centre during the war. Thereafter, the transporting of supplies eastward from the state of Mississippi was seriously interrupted for a long time, and was greatly impeded up to the close of the war, while all military operations which required railroad facilities were rendered extremely difficult.

The expedition, however, was not as successful as had been hoped. The Confederates, by the exercise of great energy in the face of many difficulties, so strengthened Mobile as to forbid an advance in that direction. Sherman, not receiving the cavalry support under Gen. Sooy Smith which he had reason to expect from Memphis, was unable to push on to Selma, Ala., one of the great manufacturing cities and storehouses for military supplies of the Confederacy. Smith, in turn, had been unavoidably detained, and Sherman returned to Vicksburg, reaching its vicinity Feb. 26. His command had marched between 300 and 400 miles, had crossed Mississippi, and inflicted well-nigh irreparable military damage; but had been prevented from carrying out his full programme by Confederate activity in assembling forces in his extreme front.

MÉRIMÉE, *mā-re-mā'*, PROSPER: novelist, historian, and archæologist, great master of French style: 1803, Sep. 28—1870, Sep. 23; b. Paris; son of J. F. L. Mérimée, painter of distinction, and secretary to the Ecole des Beaux Arts. The son entered the College of Charlemagne, studied law, and early became acquainted with English and Spanish literature. The influence of Shakespeare, Calderon, and Goethe was then making itself felt in France, and the Romantic School, headed by Victor Hugo, was contending for possession of the stage against the classic traditions of Racine. Mérimée, a devotee of the new sect, published under a double disguise his first work, *Le Théâtre de Clara Gazul*, a collection of studies for the stage, professing to be translated from the Spanish by a certain Joseph L'Estrange. This work raised great expectations, which were never real-

ized. Mérimée did not become a dramatist, and one of these pieces failed when represented 1850. His next publication, also pseudonymous, *La Guzla, by Hyacinthe Maglanovitch,* was an effort to embody the spirit of the popular lays of Illyria and Montenegro. Mérimée then became a regular contributor to the *Revue de Paris* and the *Revue des Deux Mondes;* and after one or two more anonymous efforts, signed his name to *Tamango.* After the revolution of July, he entered public life, and before long was made Inspector of Historical Monuments. During all this time he continued to write for his favorite reviews a series of romantic tales, in which terrible, almost repulsive subjects are handled with wonderful realistic power, and in a style singularly clear, condensed, and vigorous. This series, in which the *Etruscan Vase* and the *Capture of the Redoubt* especially are noteworthy, culminated in *Colomba* (1841), written by him when fresh from Corsica and its tales of vengeance. After this, his greatest and (with the exception of *Arsène Guillot* and *Carmen*) his last romance, Mérimée applied himself to historical researches. The *Conspiracy of Catiline* and the *Social War,* studies of Roman history, preliminary to a Life of Cæsar, on which he is said to have been occupied many years, appeared 1844. In this year he was elected to the chair in the Academy vacated by the death of C. Nodier. His *History of Dom Pedro the Cruel* (1848), dedicated to the Countess of Montijo, mother of the Empress Eugénie, was translated into English (1850). After the fall of the Orleans dynasty, he was placed on the commission to draw up an inventory of the art treasures left by them in France. In 1854, he published his *False Demetrii,* an episode of early Russian history. Mérimée also translated from Pushkin and Nicolas Gogol. Among his latest writings were an introduction to Marino Vretro's *Poetry of Modern Greece* (1855); two brief articles in the *Revue des Deux Mondes* (1864); and *Lettres à une Inconnue* (1873; Eng. trans. 1874). Mérimée was made senator 1853; president of the commission for reorganizing the Bibliothèque Impériale in 1858; commander of the Legion of Honor 1860. He was also one of the ten *membres libres* of the Académie des Inscriptions.

MERINO, n. *mĕ-rē'nō* [Sp. *merino,* moving from pasture to pasture, as the sheep do which produce the wool: F. *mérinos,* a merino sheep]: important breed of sheep originally Spanish, now widely diffused through other countries, and constituting a great part of the wealth of Australia. The Merino has large limbs, and the male has large spiral horns, which do not rise above the head; the skin of the neck is loose and pendulous; the cheeks and forehead bear wool; the fleece is fine, long, soft, and twisted in silky spiral ringlets, abounding in oil, which attracts dust, so that it has generally a dingy appearance. The fleece is sometimes black, and black spots are

apt to appear in even the most carefully bred flocks. The Merino sheep fattens slowly, and owes its value altogether to the excellence of its wool. It has not been found profitable where the production of mutton is a great part of the object of the sheep-farmer.—The term merino is applied also to the fabric made from the wool of this sheep. See WOOLEN MANUFACTURE.

MERIONETH, *mĕ-rē-ŏn'ĕth* or *mĕr'ĭ-ŏn-ĕth:* county of Wales, bounded w. by Cardigan Bay, n. by the counties of Caernarvon and Denbigh; greatest length about 45 m., greatest breadth about 30 m.; 600 sq.m., or 385,291 acres: chief town Dolgelley. The coast s. of the town of Harlech rises into cliffs, is skirted by sands, and fringed by three dangerous sandbanks some distance out at sea. Merioneth is the most mountainous county in Wales, though its peaks do not rise to the height of some in Caernarvonshire. The chain comprising the highest peaks runs n.w. to s.e.; its summits are Arran Mowddy (2,955 ft.) and Cader Idris (q.v.). The county is watered by the Dee, which flows n.e. and by the Mawddach and the Dovey, which have a s.w. course. The soil is generally poor, and large tracts are unfit for profitable cultivation. Slate and limestone are largely quarried; a little lead and copper is mined; and of late gold has been found. Woolens and flannels are manufactured. Pop. (1901) 47,774.

MERISMATIC, a. *mĕr'ĭz-măt'ĭk* [Gr. *merismos,* division —from *meris,* a part]: taking place by division or separation, as into cells or segments.

MERISPORE, n. *mĕr'ĭ-spōr* [Gr. *meris,* a part; *spora,* seed]: in *bot.,* a cell capable of germination, formed by the division of an ascospore or a basidiospore.

MERISTEM, n. *mĕr'ĭ-stĕm* [Gr. *meristos,* separated, divisible—from *merīzo,* I divide into parts]: in *bot.,* tissue formed of cells which are all capable of dividing, and producing new cells; also called 'generative tissue,' or cambium.

MERIT, n. *mĕr'ĭt* [F. *mérite*—from L. *merĭtum,* desert, merit: It. *merito,* merit, desert]: goodness or excellence entitling to honor or reward; value or excellence; that which is earned or deserved; desert: V. to deserve, in a good or bad sense; to have a just title to; to earn. MER'ITING, imp. MER'ITED, pp.: ADJ. deserved. MERITORIOUS, a. *mĕr'ĭ-tō'rĭ-ŭs* [L. *merĭtōrĭŭs,* that brings in money—from *mĕrĕō,* I acquire, I earn]: praiseworthy; deserving of reward or fame. MER'ITO'RIOUSLY, ad. *-ŭs-lĭ.* MER'ITO'RIOUSNESS, n. *-nĕs,* state or quality of deserving a reward.

MERITHAL, n. *mĕr'ĭ-thăl* [Gr. *meris,* a portion; *thallos,* a young shoot, a bough]: in *bot.,* a term used for 'internode'; a term applied to the different parts of the leaf. MERITHALLI, n. plu. *mĕr'ĭ-thăl'ī,* the three principal parts of a plant—the *radicular merithal* corre-

sponding to the root, the *cauline* to the stem, and the *foliar* to the leaf.

MERIVALE, *mĕr'ĭ-vāl*, CHARLES: English historian and ecclesiastic: b. Barton Place, Devonshire, 1808, Mar. 8; d. Ely 1893, Dec. 27. He was educated at Cambridge, took orders in the English Church, was rector of Lawford, Essex, 1848-69, and dean of Ely from 1869. He published *The Fall of the Roman Republic* (1853), which forms the first part of his popular *History of the Romans Under the Empire* (latest ed. 1890); *General History of Rome* (1875); *Lectures on Early Church History* (1879); etc. Consult: *Autobiography and Letters* edited by his daughter (1899).

MERIVALE, HERMAN: English statesman and political economist; brother of Charles; b. Dawlish, Devonshire, 1806, Nov. 8; d. London 1874, Feb. 9. He was educated at Oxford, where he was professor of political economy 1837-42. He was under-secretary for the colonies 1848-59, becoming perpetual under-secretary for India in 1859. He wrote *Colonization and Colonies* (1841), a much valued work; *Historical Studies* (1865); *Memoirs of Sir Philip Francis* (1867).

MERIVALE, HERMAN CHARLES: English author: b. London 1839; d. 1906, Jan. 15. He was educated at Harrow and Oxford, became a barrister of the Inner Temple in 1864 and edited the *Annual Register* 1870-80. Among his publications are: *The White Pilgrim and Other Poems* (1875); *The Cynic* (1882); several plays; *The Whip Hand* (1884); *The Dove* (1888). He was a son of J. H. Merivale.

MERIVALE, JOHN HERMAN: English scholar and translator: 1779—1844; b. Exeter. He studied at St. John's College, Cambridge, and was called to the bar 1805. He contributed largely to Bland's *Collections from the Greek Anthology* (1813; second ed. 1833). He wrote *Poems Original and Translated* (1841).

MERIWETHER, DAVID, *mĕr'ĭ-wĕth-ĕr:* 1755—1822, Nov. 16; b. Virginia. He entered the continental army as lieutenant; and, 1779, was taken prisoner at the siege of Savannah. In 1785, he settled in Wilkes co., Ga., which he several times represented in the legislature; 1802-07, he served in congress, being elected to fill a vacancy. In 1804, Jefferson, whose earnest supporter he was, made him Indian commissioner to adjust the claims of the Creeks in Florida; 1817, he was a presidential elector, and served, the same year, with General Jackson and Governor McMinn of Tennessee, on the commission which made the treaty with the Cherokees, 1817, July 8, by which a large and valuable tract in Georgia was ceded to the United States. In 1821 he was again presidential elector. He died near Athens, Ga.

MER'IWETHER, LEE: American lawyer, social reformer and author: b. Columbus, Miss., 1862, Dec. 25.

Having obtained a secondary education at Memphis, Tenn., he there published the *Free Trader* with a brother, Avery, in 1881-3, and in 1885-6 toured Europe afoot from Gibraltar to the Bosporus for study of the condition of continental workingmen and of the protective tariff. He was appointed by the secretary of the interior to write for the United States Labor Bureau a report on the *Condition of European Labor*, published in the annual report of the bureau for 1886. In 1886-9 he was employed as a special agent of the department of the interior, for which he made investigations of labor in the United States and the Hawaiian Islands, and in 1891 visited the island prisons of the Mediterranean. He was admitted to the bar in 1892, and in 1893 entered practice at St. Louis. In 1889-90 and 1895-6 he was labor commissioner of Missouri. His reports on municipal government and street railway franchises led to his nomination in 1897 for the mayoralty of St. Louis on the Democratic ticket. He was defeated at that time and also in 1901 and 1905, when he was a candidate of the Public Ownership party. Besides his various reports, he has published *A Tramp Trip: How to See Europe on Fifty Cents a Day* (1887); *The Tramp at Home* (1890); *Afloat and Ashore on the Mediterranean* (1892); *Miss Chunk* (1899); *A Lord's Courtship* (1900), and other works.

MERK, n. *mĕrk:* an old Scotch silver coin, value 13⅓*d.* sterling.

MERL, or MERLE, n. *mĕrl* [F. *merle*—from L. *merŭlă*, a blackbird]: in *Scot.*, the blackbird (q.v.).

MERLE D'AUBIGNÉ, *mārl dō-bēn-yā'*, JEAN HENRI: popular historian of the Protestant reformation: 1794, Aug. 16—1872, Oct. 21; b. Eaux-Vives, near Geneva, Switzerland. He studied there and at Berlin—under Neander—and subsequently became pastor of the French Protestant Church in Hamburg. After five years, he went to Brussels, and became chaplain of King William, who, after the revolution of 1830, invited him to Holland, as tutor to the Prince of Orange. Merle declined, and returning to Geneva, took part in the institution of a new college for propagation of orthodox theology, in which he was appointed professor of church history. His *Histoire de la Réformation au Seizième Siècle* (1835 et seq.) is written with utmost vivacity, and is sometimes eloquent. Its popularity has been immense in England and the United States as well as on the continent of Europe. Among Merle's other writings are—*Le Luthéranisme et la Réforme* (Par. 1844); *Germany, England, and Scotland* (1848); *Le Protecteur, ou la République d'Angleterre aux Jours de Cromwell* (1848); *Trois Siècles de Lutte en Ecosse* (1850); *Caractère du Réformateur et de la Réformation de Génève,* and *Histoire de la Réformation en Europe au Temps de Calvin* (1862-77). He died at Geneva.

MERLIN, n. *mêr'lĭn* [Gael. *murluin*, a fish-basket]: in *Scot.*, a fish-basket.

MERLIN, n. *mêr'lĭn* [OF. *esmerillon* and *emerillon:* It. *smeriglio*], (*Falco æsalon* or *Hypotriorchis æsalon*): small species of hawk, one of the smallest of *Falconidæ*, 11 in. to 12½ in. in length, but very bold and powerful, and possessing all the characters of the true falcons, with the distinction of large hexagonal scales on the front of the tarsi. It is of a bluish ash color above; reddish yellow on the breast and belly, with longitudinal dark spots, the throat of the adult male white. The wings reach to two-thirds of the length of the tail. It builds its nest on the ground, and is fond of localities where large stones are plentiful, on which it is often seen perched, and is therefore often called the *Stone Falcon*. It is common in parts of Europe, is found in Asia very frequently, and extends southward in Africa, even to the Cape of Good Hope. It was of great repute in the days of falconry, being very easily trained, and flying readily at its quarry. It was therefore often used for taking partridges and wood-pigeons. It is a very lively bird, and often utters a harsh scream. It usually flies low and very rapidly, threading its way, if necessary, through branches and leaves, but it will also follow its prey in mounting upward to a great height.

MERLIN, *mêr'lĭn:* ancient Welsh prophet and enchanter, whose date is conjecturally assigned to the period of decline of the native British power in its contest with the Saxon invaders. Both the Cambrian and the Strathclyde Britons boasted of a Merlin who was, in all probability, the same personage decked out in different legendary guise.—The Cambrian Merlin, called Merlin *Emyrs* or *Ambrosius*, is said by Geoffrey of Monmouth, in his *Historia Brittonum*, to have lived in the 5th c., to have sprung from the intercourse of a demon with a Welsh princess, and to have displayed miraculous powers from infancy. He is alleged to have been the adviser of King Vortigern, and subsequently of Ambrosius, Uterpendragon, and the great King Arthur. He is often alluded to by the earlier poets, especially Spenser, in his *Fairy Queen*, and figures in Tennyson's *Idylls of the King*. A collection of prophecies attributed to him appeared in French (Paris 1498), in English (Lond. 1529 and 33), and in Latin (Venice 1554); and their existence is traceable at least as far back as the time of the poet Lawrence (about 1360).—The Strathclyde, or the *Scottish* Merlin, called Merlin the Wyllt, or Merlin Caledonius, is placed in the 6th c., and appears as a contemporary of St. Kentigern, Bishop of Glasgow. His grave is still shown at Drummelzier on the Tweed, where, in attempting to escape across the river from a band of hostile rustics, he was impaled on a hidden stake. A metrical life of him extending to more than 1,500 lines, professedly based on Armoric materials, and incorrectly ascribed to Geoffrey

of Monmouth, was published by the Roxburghe Club 1830. His prophecies—published at Edinburgh 1615—contain those ascribed to the Welsh Merlin.

MERLON, n. *mĕr'lŏn* [F. and Sp. *merlon*]: in *fort.*, the part of an embattled parapet between two embrasures, having a usual length of 15 to 18 ft.

MERMAID, n. *mĕr'mād* [AS. *mere*, a lake; *mægd'*, a maid: F. *mer;* L. *mărĕ*, the sea, and Eng. *maid:* Ger. *meer;* W. *mor*, the sea]: fabled sea-woman, the upper half in the shape of a woman, and the lower forming the tail of a fish. MERMAN, n. *mĕr'măn*, the male of mermaid.—The *Mermaid* is represented usually with the upper parts resembling those of a human being, generally of a woman—though the *Merman* also is sometimes heard of—while the body terminates in the semblance of a fish. There is an evident affinity between the stories concerning mermaids and those concerning the sirens and tritons, perhaps also the nereids, of the ancients. The probability is that these stories originated in the appearance of seals, walruses, and perhaps still more of the herbivorous cetacea, in regions where they are rare, or to persons unaccustomed to see them. Many of the stories concerning mermaids belong to the northern parts of the world, where the herbivorous cetacea are rare, and perhaps some of the solitary seals have often given occasion to them. But the herbivorous cetaceans do occasionally wander into the British, and probably even into more northern seas. Sir James Emerson Tennent says concerning the Dugong (q.v.): 'The rude approach to the human outline observed in the shape of the head of this creature, and the attitude of the mother while suckling her young, holding it to her breast with one flipper, while swimming with the other, holding the heads of both above water; and when disturbed, suddenly diving and displaying her fish-like tail—these, together with her habitual demonstrations of strong maternal affection, probably gave rise to the fable of the mermaid; and thus that earliest invention of mythical physiology may be traced to the Arab seamen and the Greeks, who had watched the movements of the dugong in the waters of Manaar.' There is possibility of the existence in the ocean of cetaceans not yet known to naturalists. In the old and vulgar superstition, the mermaid was a being of supernatural knowledge, who was capable of human loves and hates and of being wedded to a human lover; her life in the sea was a succession of delights, but her association with man usually brought some evil.—The mermaid is a not unfrequent heraldric bearing. In the heraldry of France, she is called a Siren, and in Germany she is occasionally furnished with two fishy tails,

MERMAID'S GLOVE (*Halichondria palmata*): largest of British sponges. It grows in deep water, and is sometimes two ft. in height. It receives its name from the somewhat finger-like arrangement of its branches. It is not slimy, and has a very porous surface; rough, with myriads of minute fragile spiculæ. Its color is yellowish.

MEROBLASTIC, a. *mĕr′ō-blăs′tĭk* [Gr. *mĕros*, a part; *blastos*, a bud]: applied to an ovum whose vitellus is only partially segmented, as distinguished from *holoblastic*, which denotes an ovum whose vitellus is wholly segmented: see HOLOBLASTIC.

MERODACH, *mē-rō′dăk* or *mĕr′o-dăk:* a deity of Babylon, son of Êa; in the earlier mythology, a herald and champion of the gods; later, the guardian of the empire. M. is coupled with Bel or Belus, Jer. l. 2 (see BAAL); and it is conjectured that in later times the distinction between the two had been lost, and that to M. were ascribed the qualities and powers of the far mightier god. Nebuchadnezzar addresses M. as though holding this view of him. His name frequently formed a part of Babylonian proper names.

MER′ŎĔ: see ETHIOPIA.

MEROM, *mē′rom*, LAKE; or LAKE HULEH, *hō′lĕh:* triangular lake in n. Palestine, an expansion of the upper Jordan; 11 m. n. of the Lake of Galilee; about 6 m. long, 3½ m. wide, 11 ft. deep—though its dimensions vary according to the rains. It was the scene of Joshua's defeat of the Canaanite kings (Josh. xi. 5, 7). It is surrounded by marshes, and large areas of it are covered with yellow and white water lilies and Egyptian papyrus. The modern Arab name is Hûleh—applied also to the district near.

MEROPE, n. *mĕr′o-pē* [L.—from Gr. *Meropē*]: in *class. myth.*, one of the Pleiades, who were regarded as daughters of Atlas: see PLEIADES.

MER′OPIS: island of the Grecian Archipelago: see COS.

MEROPS, n. *mē′rŏps* [L. and Gr. *merops*, the bee-eater]: the bee-eater; a bird of the genus *Merop′ĭdæ*, living chiefly upon the various species of bees and wasps. MEROPIDÆ: see BEE-EATER.

MEROSTOMATA, n. plu. *mē′rō-stŏm′ă-tă* [Gr. *mēros*, the upper part of the thigh; *stoma*, a mouth]: an ord. of Crustacea, embracing the king-crabs or horseshoe crabs, in which the appendages placed round the mouth, and performing the office of jaws, have their free extremities developed into walking or prehensile organs.

MEROVINGIANS, *mē-rō-vĭn′jĭ-anz:* first dynasty of Frankish kings in Gaul. The name is derived from Merwig or Merovaens, who ruled about the middle of the 5th c., having united a few tribes under his sway. His grandson, Chlodwig or Clovis (q.v.), greatly extended his dominions, and on his death, divided his kingdom among his four sons, one of whom, Chlotar or Clotaire I., re-

united them under his own sway 558. On his death, 561, the kingdom was again divided into four parts—Aquitaine, Burgundy, Neustria, and Austrasia. His grandson Clotaire II. again united them 613; but after his death, 628, two kingdoms, Neustria and Austrasia, were formed, in both of which the Merovingian kings retained merely nominal power, the real power having passed into the hands of the mayors of the palace.—The dynasty of the Merovingians terminated with the deposition of Childeric III., 752, and gave place to that of the Carlovingians (q.v.) or Karlings. Merovingian should be spelt *Merwings.*—The chief authority for the early history of the Merovingians is Gregory of Tours. See Thierry's *Récits Mérovingiens* (1839), Montenon, *La Dynastie Mérovingienne* (1863); and German works by Löbell (1869), Richter (1873), and Arndt (1874).

MERRIAM, *mĕr'ĭ-am,* Clinton Hart: American biologist and author: b. New York City 1855, Dec. 5. He was graduated from Yale in 1877 and from the College of Physicians and Surgeons in New York in 1879, and practiced medicine, 1878-85. He was United States Bering Sea commissioner in 1891 and visited Alaska in the interest of fur seal investigations. He has held various commissions from the government in the field of biology and has made explorations in its interest in the far West. He has written: *Birds of Connecticut* (1877); *Mammals of the Adirondacks* (1882-4); *Results of Biological Survey of San Francisco Mountain Region and Desert of Little Colorado in Arizona* (1890); *Flora and Fauna of the Death Valley Expedition* (1893); *Life Zones and Crop Zones of the United States* (1898); etc.

MERRIAM, Henry Clay, A.M.: American soldier: b. Houlton, Me., 1837, Nov. 13. He was graduated from Colby University, and began the study of law; but in 1862 entered the Union army as captain in a Maine regiment. He was at the battle of Antietam in 1862, and organized the colored troops in 1863, being lieutenant-colonel of the Louisiana Native Guard (a negro regiment) at the close of the war; he led the assault on Fort Blakely 1865, Apr. 9, and obtained a medal of honor from Congress for gallant conduct. In 1866 he was appointed major in the regular United States army, and rose to the rank of brigadier-general in 1897 and major-general of volunteers in the Spanish war, 1898. He served in many expeditions against the Indians, and protected American citizens in the valley of the Rio Grande in the revolutionary troubles (1873-6). In 1898 he was commander of the departments of the Columbia and California, and organized, equipped and forwarded the troops to the Philippines; and in 1899 was sent to the Philippines in command of the army of occupation. In 1900, Jan., he was placed in command of the Department of the Colorado, and in 1901 was retired from

active service. He is the inventor of the Merriam infantry pack.

MERRIAM, WILLIAM RUSH: American financier: b. Wadham's Mills, N. Y., 1849, July. He was graduated from Racine College, Wisconsin, in 1871 and entered the First National Bank of St. Paul, where he was cashier in 1873. In 1880 he was president of the Merchants' National Bank there and in 1882 became a member of the state legislature of Minnesota and was speaker in 1886. He was elected governor of Minnesota in 1889 and was director of the United States census in 1898-03.

MERRICK, *mĕr'ĭk*, LEONARD: English novelist: b. Belsize Park, London, 1864, Feb. 21. He was educated at Brighton College, and among his novels, several of which have been reprinted in this country, are: *Mr. Bazalgette's Agent; The Man Who Was Good; Cynthia: a Daughter of the Philistines; When Love Flies Out of the Window; Conrad in Quest of His Youth; The Quaint Companions;* etc. He is also the author of several plays.

MERRIFIELD, *mĕr'ĭ-fēld*, WEBSTER, A.M.: American educator: b. Williamsville, Vt., 1852, July 27. He was graduated from Yale in 1877 and was an instructor there 1879-83. From 1884 to 1891 he was professor of Greek in the University of North Dakota, professor of political economy, 1891-1903, and president of the institution since 1891.

MERRILL: city and county seat of Lincoln co., Wis.; on the Wisconsin river, and on the Chicago, Milwaukee & St. Paul railroad; about 145 m. n. of Madison. It was settled in 1875 and incorporated in 1880. It is in a part of the state where the chief industries are connected with lumbering. Merrill has manufacturing establishments for shingles, laths, planed lumber, sawed lumber, sash, doors, and blinds, clapboards, lumber for interior finish, flooring, etc. It has a high school, an opera house, a courthouse which cost about $100,000, and the T. B. Scott Public Library. Pop. (1900) 8,537.

MERRILL, *mĕr'ĭl*, GEORGE EDMANDS, A.M., D.D., LL.D.: American Baptist clergyman and educator: b. Charlestown, Mass., 1846, Dec. 19; d. Hamilton, N. Y., June 11. He was graduated from Harvard in 1869, and from the Newton Theological Seminary in 1872. Entering the Baptist ministry, he was pastor at Springfield, Mass. (1872-7); at Salem, Mass. (1877-85); at Colorado Springs (1885-7); and at Newton, Mass. (1890-9). In 1899 he was called to the presidency of Colgate University, Hamilton, N. Y., where his administration was of a constructive nature, improving the standard and awakening interest in many new lines of college activity. He wrote *Story of the Manuscripts* (1881); *Crusaders and Captives* (1890); *The Reasonable Christ* (1893); *The Parchments of Faith* (1895); etc.

MERRILL, Lewis: American soldier: b. New Berlin, Pa., 1834, Oct. 28; d. Philadelphia 1896, Feb. 27. He was graduated from West Point in 1855, and at the outbreak of the Civil war was appointed colonel of a volunteer cavalry regiment and served with distinction through the war. He was active in warfare with the Indians and performed the notable service of breaking up the Kuklux Klan in 1868, which was recognized by Congress after some delay by promotion to the rank of lieutenant-colonel of cavalry.

MERRILL, Selah, A.M., D.D., LL.D.: American Congregationalist clergyman and archæologist: b. Canton Centre, Conn., 1837, May 2. He was educated at Yale and at the New Haven Theological Seminary and was ordained to the ministry in 1864 when he entered the Federal army as chaplain. He held pastorates in Leroy, N. Y., and in San Francisco, and was for a time professor of Hebrew at Andover Theological Seminary. In 1882-6, 1891-4 and 1898-1907 he was United States consul at Jerusalem and made valuable archæological researches and discoveries there. Since 1907 he has been consul at Georgetown, Guiana. He has written: *East of the Jordan* (1881); *Galilee in the Time of Christ*, (1881); *The site of Calvary* (1885); *Ancient Jerusalem* (1906); etc.

MERRILL, Stephen Mason, D.D.: American Methodist bishop: b. Jefferson co., Ohio, 1825, Sep. 16; d. Keyport, N. J., 1905, Nov. 12. He studied for the ministry and was ordained by the Ohio Conference in 1846, and in 1868-72 was editor of the *Western Christian Advocate*. In 1872 was appointed bishop. He published: *Christian Baptism; Union of American Methodism; Sanctification* (1901); *Miracles* (1902).

MERRILL, William Emery: American military engineer: b. Fort Howard, Wis., 1837, Oct. 11; d. near Edgefield, Ill., 1891, Dec. 14. He was graduated from West Point in 1859 and for a year prior to the outbreak of the Civil war was assistant professor in engineering at West Point. He went to the front in 1861, and served with distinction at Yorktown, Chickamauga, Missionary Ridge and other famous battles and in 1864-5 had charge of the railroad which supplied the armies in Georgia and Tennessee and was brevetted colonel for his services. After the war he served as chief engineer on the staff of General Sherman and was engaged in western surveys and the improvement of rivers. He was in charge of the improvement of the Ohio river at the time of his death, which occurred on a railroad train. He wrote *Iron Truss Bridges for Railroads* (1870) and *Improvement of Non-Tidal Rivers* (1881).

MERRIMAC, *mĕr'ĭ-măk*, River: rising in New Hampshire, flowing s. into Massachusetts, and then e. and n.e. into the Atlantic ocean at Newburyport; length

about 120 m. It receives several small tributaries, and has numerous falls, affording immense water-power, on the principal of which are the manufacturing towns of Nashua and Manchester, N. H., and Lowell and Lawrence, Mass. It is navigable 15 m. to Haverhill.

MERRIMAN, MANSFIELD, PH.D.: American civil engineer: b. Southington, Conn., 1848, Mar. 27. He was graduated from Yale in 1871 and in 1872-3 was assistant engineer in the United States corps of engineers. He was instructor in civil engineering at Sheffield Scientific School, Yale, in 1875-8 and professor of civil engineering at Lehigh University, 1878-1907. In 1880-5 he was also a member of the United States Coast and Geodetic Survey. He is a member of many scientific societies, and has published: *Theory of Continuous Bridges* (1876); *Mechanics and Materials* (1885); *Treatise on Hydraulics* (1889); *Precise Surveying and Geodesy* (1899); *Elements of Sanitary Engineering* (1906); etc.

MERRIMAN, TITUS MOONEY, A.M.: American Baptist clergyman: b. Charleston, P. Q., 1822, Apr. 23. He was graduated from Canada Baptist College, Montreal (now McMaster Hall, Toronto), in 1844, served in the United States Christian Commission during the Civil war, and became a naturalized citizen of the United States in 1882. He was a professor at Laselle Seminary, Auburndale, Mass., 1864-95. He published *William, Prince of Orange* (1874); *Pilgrims, Puritans and Roger Williams Vindicated* (1892); *Ecclesia: or Christ's First Church in Jerusalem* (1900); etc.

MERRITT, *mĕr'it*, WESLEY: b. New York, 1836, June. He graduated from West Point Military Academy 1860, July, was connected with the dragoons, promoted first lieutenant, 1861, May, and captain 1862, Apr. In 1863, June, he became brigadier-general of volunteers and was brevetted major for brilliant service at the battle of Gettysburg. In 1863-4 he participated in the Virginia campaigns. For gallant service in various engagements he was brevetted lieutenant-colonel and colonel in the army and major-general of volunteers, and afterward was commissioned major-general of volunteers to date from the battle of Five Forks. He was appointed by General Grant one of the three commissioners to act upon the surrender of the Army of Northern Virginia. After the Civil war he was chief of cavalry in different departments, and for several years was actively engaged in protecting the frontier against Indian raids; 1882 became superintendent of the military academy at West Point; 1887 was promoted brigadier-general in the regular army and succeeded General Wilcox in command of the department of Missouri. Being appointed to command the United States army in the Philippines during the Spanish-American war (1898), Merritt sailed for

Manila June 28, and landing at Cavité, Manila harbor, July 29, at once assumed direction of affairs. Forcing the fighting, he quickly brought about the surrender of the Spaniards, and entered the city of Manila Aug. 13. Two weeks later he sailed for Paris, where he was to meet the peace commissioners and give the conference the benefit of his views on the general state of the Philippine Islands. He arrived in that city Oct. 3, and appeared before the commission on the 5th. On his return to the United States he was appointed commander of the Department of the East; retired 1900, June 16.

MERRY, a. *mĕr'rĭ* [AS. *mirig,* merry, pleasant: Lap. *murre,* delight: Gael. *mir,* to sport; *mireag,* sport]: loudly cheerful; gay of heart; causing laughter or mirth; delightful; in *OE.,* sweet or pleasant; active or brisk. MER'RILY, ad. *-lĭ,* gayly; cheerfully; with mirth. MER'RINESS, n. *-nĕs,* or MERRIMENT, n. *-mĕnt,* gayety, with laughter or noise; hilarity. MERRY-ANDREW, *mĕr'-rĭ-ăn'drô* [supposed to have originated from a facetious physician in the time of Henry VIII.]: one who makes sport for others; a buffoon or clown; one who attended a quack doctor to collect a crowd. To MAKE MERRY, to be jovial; in *Scrip.,* to feast. MERRYMEETING or -MAKING, a meeting for mirth; a festival. MERRY-THOUGHT, the forked bone of the breast of a fowl, which, pulled and broken between two young people, is supposed to betoken priority of marriage to the one holding the larger piece.—SYN. of 'merry': blithe; blithesome; lively; airy; cheerful; sprightly; gleeful; vivacious; joyous; jocund; sportive; mirthful.

MERRY, ROBERT: English poet and eccentric: b. London 1755, Apr.; d. Baltimore, Md., 1798, Dec. 14. He was educated at Christ's College, Cambridge, and studied law at Lincoln's Inn; and about 1784 settled in Florence, where he was made a member of the Della Crusca Academy, and wrote much sentimental verse. He returned to England in 1787; printed some of his verse, which was sarcastically praised by Walpole and was the butt of Gifford's *Baviad;* and in 1791 married an actress. In 1796 they came to America, where his wife acted with great success and where Merry was regarded as a very superior poet. *The Abbey of St. Augustine,* a play by him, was acted in Philadelphia in 1797.

MERRY, WILLIAM WALTER, D.D., D.LITT.: English Anglican clergyman and classical scholar: b. Worcestershire 1835, Sep. 6. He was educated at Oxford and has been rector of Lincoln College there from 1884. In 1861 he became vicar of All Saints Church, Oxford, was select preacher to the University 1878-9, and again in 1889, and public orator in the University in 1880. He is widely known for his editions of the classics published by the Clarendon Press and including the *Odyssey* (Books I. to

XII., 50th thousand; XIII. to XXIV., 15th thousand); and the plays of Aristophanes. He is the author of *The Greek Dialects* (1875).

MERSEY, *mĕr'zĭ:* important river of England, separating in its lower course, the counties of Cheshire and Lancashire. Its origin is in the junction of the Thame and Goyt, on the borders of Derbyshire, e. of Stockport. It flows w.s.w., and is joined on the right by the Irwell from Manchester, at which point it becomes navigable for large vessels. Besides the Irwell, the chief affluents are the Bollin and the Weaver, from Cheshire. At its junction with the Weaver, the Mersey expands into a wide estuary, which forms the Liverpool channel, about 16 m. long, 1 to 3 m. broad; opposite Liverpool it is 1¼ m. in width, with considerable depth at low water. It is much obstructed by sandbanks; but an excellent system of pilotage renders the navigation comparatively secure. Entire length of the Mersey with its estuary, nearly 70 m.

MERTHYR-TYDVIL, *mĕr'thĕr-tĭd'vĭl,* W. *mĕr'thĕr-tŭd'vĭl:* market town of S. Wales, on the n. border of the county of Glamorgan, abutting on the county of Brecknock. It is surrounded by lofty hills, and is on the river Taff, 500 ft. above sea-level, 24 m. from its mouth and port at Cardiff; and it includes the junctions of the greater and lesser Taff, the Morlais, and the Dowlais, streams which here unite to constitute the main river. Merthyr-Tydvil is the seat of the iron trade of Glamorgan, as represented by the great works at Dowlais, Cyfarthfa, and Plymouth, and in a less degree at Penydarren. It has also large collieries, and is famed, with Aberdare, for the excellence of its steam coal. From about 1835 the manufacture of finished iron, chiefly rails, merchant-bars, girders, and ship-plates, grew rapidly; of late, steel is very largely produced. The exports of coal are considerable, but the chief consumption is within the works. The population are directly dependent upon the iron-works, there being no other trade or manufacture. Railways branch from Merthyr-Tydvil to Brecon, to Swansea, to Cardiff and Penarth, and to Newport and Hereford. Dowlais contains some fine public buildings, but Merthyr-Tydvil is deficient in this respect. Though a busy place, it has not a fine appearance, having risen very rapidly with the local trade, and having attained nearly its present dimensions before it was under any but the ordinary parochial government. There are, however, signals of improvement. It is well supplied with water, and the infantile mortality, long extraordinary, is now reduced. The people, chiefly Welsh, are industrious, and orderly. The place is said to take its name from the martyrdom here of a female British saint, Tydvil or Tydfil. Pop. about 70,000.

MERTON COLLEGE, *mêr'ton*, OXFORD: the House of the Scholars of Merton, the model of all the secular colleges, was founded first in Maldon in Surrey by Walter de Merton, Bp. of Rochester, and Lord High Chancellor, 1264, for the maintenance of 20 scholars in the schools of Oxford, and of a warden and three or four ministers of the altar, who were to manage the property. Before 1274, he transferred his warden and ministers to Oxford—thereby not only founding his own college, but contributing in no small degree to fix the university in its present locality. The fellows were to be as many as the means of the house could maintain, and after some changes, this number was fixed by Abp. Laud at 24. They were to be elected first and chiefly from the founder's kin; but this was from an early period evaded, and the commissioners of 1852 speak of 'a common belief in the university that the elections to fellowships at Merton were formerly determined by personal interest.' In 1380, Dr. Wylliot, Chancellor of Exeter, endowed 12 *portionistæ*, or postmasters as they are now called, equivalent to the scholars of other colleges; and 1604, John Chamber, fellow of Eton, endowed two more, restricted to foundationers from Eton. By the ordinances under 17 and 18 Vict. c. 81, considerable changes were made—six fellowships were suspended, of which two were assigned to increase the postmasterships, etc., and four to the endowment of the Linacre professorship of physiology, of value £800 per annum. The remaining 18 were thrown open, and not to exceed £250 per annum, exclusive of rooms, until the original number of 24 was restored. The number now being completed, they have reached their limiting value of £300. Sixteen postmasterships, and four scholarships, each of the value of £80 a year, are open without restriction; two postmasterships are thrown open in default of candidates from Eton. This college possesses 18 benefices.

MERU, *mā'rû*, in Hindu Mythology: fabulous mountain in the centre of the world, 80,000 leagues high; most sacred of all mythical mountains, the abode of Vishnu, and endowed with all imaginable charms.

MERULIDÆ, *mē-rô'lĭ-dē*, or TURDIDÆ, *têr'dĭ-dē:* family of birds of order *Insessores*, sub-order *Dentirostres*, having arched and compressed bills, which are pointed and notched, but not strongly. The species are very numerous, and very widely distributed over the globe, some in cold and some in warm climates. Some are migratory; a few species are gregarious at all seasons, many are gregarious only in winter. They generally build their nests in trees. They feed chiefly on soft animal and vegetable substances, as berries, insects, and worms. Many are birds of very sweet song; some are remarkable for their imitative powers. To this family belong thrushes (among which are reckoned the blackbird, redwing, fieldfare, ring-ouzel, etc.), orioles, mocking-birds, dippers, etc.

MERV, *mĕrv:* district of central Asia, in W. Turkestan, on the borders of Iran and Turan; mostly an oasis in a desert; about 250 m. from Herat, 360 m. s.e. of Khiva, 65 n. of the Afghan frontier, and 12 m. e. of the Murghab river. According to O'Donovan, who spent six months there, M. is not a town, but a collection of small Turkoman settlements, scattered over an oasis, 60 m. long by 40 broad. The largest settlement, one of 1,000 huts and tents, is near a fort called Koushid Khan Kala, the present capital. M. was taken into possession by Russia 1884, an act which has excited British apprehension as an advance toward Herat the Key of India. The situation has always been regarded as one of strategic importance, and its recent occupation seems a part of a far-reaching Russian plan. The inhabitants are rude and wild; they are Turcomans of the Tekke tribe. On the banks of the rivers are ruins of ancient and powerful cities. See Marvin's *Merv, the Queen of the World* (1880); and O'Donovan's *The Merv Oasis*, 2 vols. (1882).

MERYCOTHERIUM, n. *mĕr'ĭ-kō-thē'rĭ-ŭm* [Gr. *mēru'kō*, I ruminate; *therĭŏn*, a beast]: in *geol.*, a huge ruminant found along with the mammoth and rhinoceros in the Drift or Upper Tertiary beds of Siberia—allied to the double-humped camel.

MESA, n. *mā'za* [Sp.—from L. *mensa*, a table]: a high plain or table-land; especially a table-land of small extent rising abruptly from a surrounding plain; a term frequently used in that part of the United States bordering on Mexico.

MESAGNA, *mā-sân'yâ:* town of the province of Lecce, s. Italy, 27 m. n.w. of Lecce. The district around is fruitful. Pop. 8,500.

MÉSALLIANCE, n. *māz'ăl-lĭ-ângs'* [F. *mésalliance*]: the French spelling of MISALLIANCE, which see.

MESCAL, n. *mĕs'kal* [Sp.]: a strong intoxicating spirit, distilled from pulque, the fermented juice of the *Agave Americana* of Mexico.

MESCALA, *mĕs-kâ'la:* river, rising in s.e. Mexico near Puebla, flowing w. and s. 400 m. into the Pacific at the port of Zacatula. It is named in successive parts of its course, the Atoyac, Rio Pablano, Rio da las Balsas, and Zacatula.

MESDAMES, n. plu. *mĕz'dăms* in Eng., but *mā-dâm'* in F.—the plu. of *madame*.

MESEMBRYACEÆ, *mē-sĕm-brī-ā'sē-ē*, or FICOIDEÆ, *fī-koyd'ē-ē:* natural order of exogenous plants, both herbaceous and shrubby, but all succulent. As defined by some botanists, it includes the orders *Tetragoniaceæ*, *Sesuviaceæ*, etc., of others. Of the more restricted M., about 400 species are known, a few of which are natives of s. Europe; the greater number belong to s. Africa and the South Sea Islands.—The Ice Plant (q.v.) is of this order. The leaves of some species, when burned, yield soda in great abundance; large quantities of ba-

rilla are made from them in the Canary Islands, in Spain, and in Egypt. The seeds of some, e.g., *mesembryanthemum crystallinum* (the ice plant) and *M. geniculiflorum*, are ground into flour for bread. *M. geniculiflorum* is used as a pot-herb in Africa. The fruit of *M. edule* (Hottentot's fig) is eaten in South Africa, and that of *M. æquilaterale* (pig's-faces) in Australia.—*M. emarcidum* is called *Kou* by the Hottentots, who beat and twist the whole plant, allow it to ferment, and chew it like tobacco.

MESEMBRYANTHEMUM, n. *mĕs-ĕm'brĭ-ănth'ĕ-mŭm* [Gr. *mesēm'brĭă*, mid-day; *anthĕmon*, a flower]: a genus of beautiful and well-known succulents, among which is *M. crystal'lĭnum*, or ice-plant, remarkable for ice-like vesicles covering its surface, ord. *Mesembryăcĕæ* (q.v.).

MESENTER'IC DISEASE: disease of the mesentery (q.v.), or the broad fold of peritoneum (the great serous membrane of the abdomen), surrounding the jejunum and the ileum, and attached posteriorly to the vertebral column. Its breadth between the intestinal and vertebral borders is about 4 in.; its attachment to the vertebral column is about 6 in. in length, and its intestinal border extends from the duodenum to the end of the small intestine. It serves to retain the small intestines in their place, while allowing the necessary amount of movement; and it contains between its layers the mesenteric vessels, the lacteal vessels, and mesenteric glands. The glands are 100 to 150 in number, and are about the size of an almond. They exert an organizing action on the contents of the lacteals, the chyle being more abundant in fibrine and in corpuscles after it has passed through them. Hence, it is obvious that disease of these glands must always seriously affect the process of assimilation. The most important affection of these organs is tuberculous in nature, which gives rise to the disease known as *tabes mesenterica*, a disease most common in childhood, but confined to no period of life. In the great majority of cases it is associated with, and often marked by, other results of tuberculosis, such as pulmonary consumption, tuberculous peritonitis, Pott's disease of the spine, etc.; but sometimes the mesenteric glands seem almost exclusively affected, in which case the disease becomes sufficiently distinct to allow of easy detection. The leading symptoms are acceleration of the pulse, occasional fever, especially toward evening, loss of color and flesh, derangement of the digestive organs (constipation or diarrhea, and occasional vomiting), a steady pain in the region of the navel, increased by pressure; but perhaps the most characteristic symptom is tumefaction and hardness of the abdomen, with general emaciation. The enlarged glands can sometimes be detected by a careful examination with the hand, especially in advanced cases. The progress of the disease is generally slow, but at

length hectic fever sets in, the emaciation becomes extreme, dropsical effusion appears, and the patient dies exhausted, if not cut off by some acute inflammation.

The treatment is in the main the same as that of any other form of tuberculosis, namely, the administration of cod-liver oil, or, if the stomach is too irritable to bear that medicine, of iodide of iron, combined with some bitter infusion, the bowels being at the same time carefully attended to. The application of iodine ointment to the abdomen is often of great service. When the disease has advanced to a considerable extent, remedies are of little use, except to palliate some of the more urgent symptoms.

Independently of the disease above noticed, inflammation of these glands is not uncommon, when the mucous membrane of the small intestine is ulcerated, as, for example, in typhoid fever. In this case the inflammation is transitory and the swelling of the glands subsides as the typhoid lesions in the intestine get well.

MESENTERY, n. *mĕz'ĕn-tĕr-ĭ* [Gr. *mesenter'ĭŏn*—from *mesos,* middle; *enteron,* intestine]: a membrane in the cavity of the abdomen which serves to retain the intestines and their appendages in their position: it is connected to the middle portion of the small intestines. MES'ENTER'IC, a. *-tĕr'ĭk,* belonging to the mesentery. MESERAIC, a. *mĕz'ĕr-ā'ĭk* [Gr. *mesaraion,* mesentery, the middle of the bowels]: belonging to the mesentery.

MESH, n. *mĕsh* [Lith. *mazgas,* a knot; *megsti,* to knit: Ger. *masche,* a noose: AS. *maesce;* Dan. *maske,* a mesh: Dut. *masche,* a blot, a stain]: one of the openings between the threads of a net: V. to catch in a net; to ensnare. MESH'ING, imp. MESHED, pp. *mĕsht.* MESHY, a. *mĕsh'ĭ,* formed like net-work. MESH-WORK, net-work.

MESHID, *mĕsh'ĭd:* important city of Persia, capital of the province of Khorassan, in a fertile and well-cultivated plain, on the Tejend; lat. 36° 17′ n., long. 59° 40′ e. It is by far the most important town of northeastern Persia, being the centre of numerous converging routes. The city presents a surprising and beautiful view from a distance. Above the walls, which are of vast circuit, shine the gilded dome of one of the most splendid mosques of the east, the beautiful minarets of the tomb of Imaum Riza, a follower of Ali, and the summits of other sacred buildings. Meshid, as the chief seat of the great sect of the Shiites, is of nearly equal importance with Mecca, sacred city of the orthodox Mohammedans. The town has manufactures of woolen goods and of metal-wares, especially sword-blades, gold work, and articles of jewelry. It is visited annually by 80,000 to 100,000 pilgrims. Caravans arrive almost daily. In the neighborhood are the ruins of Thus, old capital of Khorassan, which contains the tomb of the celebrated poet Firdûsi. Pop. 70,000.

MESIAL, a. *mē'zhĭ-ăl* [Gr. *mesos*, middle]: in *anat.*, middle; dividing into two equal parts. MESIAL LINE, an imaginary plane dividing the head, neck, and trunk into similar halves toward right and left.

MESILLA, *mā-sēl'yâ:* valley and town on the Rio Grande, New Mex., acquired of Mexico by the United States 1834 by purchase, under the Gadsden treaty; lat. 32° 17′ n., long. 106° 45′ w. The valley is narrow, but fertile, on the s. overland route to California. The town was settled 1850. Pop. (1870) 1,578; (1900) 1,274.

MESLIN: see MASLIN.

MESMER, *mĕs'mĕr*, FRANZ (according to some, FRIEDRICH-ANTON): founder of the doctrine of Animal Magnetism, or Mesmerism (see HYPNOTISM): 1733 or 4–1815, Mar. 5; b. at a village near the Bodensee. He studied at Vienna, and there took the degree M.D. 1766. About 1772, he began, with Father Hell, to investigate the curative powers of the magnet, and was led to adopt the opinion, that there exists a power similar to magnetism, which exercises an extraordinary influence on the human body: this he called Animal Magnetism, and published an account of his discovery, and of its medicinal value, 1775. Honors were conferred on him in Germany. In 1778, he went to Paris, where he attracted much attention. His system obtained the support of members of the medical profession, as well as of others; but he refused an offer of an annual pension of 20,000 livres (about $4,000) to reveal his secret; and this, with other circumstances, gave rise to suspicion, and induced the government to appoint a commission of physicians and naturalists, whose report was unfavorable to him. He then fell into disrepute, and after a visit to England, retired to Meersburg, where he spent the rest of his life in complete obscurity.

MESMERISM, n. *mĕz'mĕr-ĭzm* [F. *mesmérisme*—from *Mesmer*, who first brought it into notice about 1776]: art of inducing a state of complete coma or insensibility, or of somnambulism, in which the operator claims to control the actions, and communicate directly with the mind, of the recipient; the doctrine of animal magnetism. M. is more properly termed HYPNOTISM (q.v.). MESMERIC, a. *mĕz-mĕr'ĭk*, or MESMER'ICAL, a. *-ĭ-kăl*, pertaining to mesmerism. MESMERIZE, v. *mĕz'mĕr-īz*, to influence by external agency so as to cause a state of complete insensibility, or a state of somnambulism. MES'MERIZING, imp. MES'MERIZED, pp. *-īzd:* ADJ. being in the mesmeric state. MES'MERIZA'TION, n. *-zā'shŭn*, the act of mesmerizing. MES'MERIZER, n. *-ī-zĕr*, one who practices mesmerism. MES'MERIST, n. *-ĭst*, one who practices mesmerism or believes in it.

MESNE, a. *mēn* [Norm. F. *mesne*, middle: L. *medĭŭs*, middle]: in *law*, middle; intervening—applied to a writ issued during the progress of an action. MESNE LORD, in *English law*, a lord who is himself a tenant to some other lord called a lord paramount. The phrase is not now

used, because subinfeudation was abolished in the time of Edward I. MESNE PROCESS, name given to writs which issued in respect of a pending action before final judgment was given. MESNE PROFITS are the profits or rents drawn by a person who is wrongfully in possession of real property, and who is afterward ejected, in which case the mesne profits are recoverable with the estate itself.

MESO-, *mĕs′ō* [Gr. *mesos*, the middle]: a common prefix in scientific compound terms, signifying 'intermediate'; that which holds a middle place between others.

MESOBLAST, n. *mĕs′ō-blȧst* [Gr. *mesos*, middle; *blastos*, a bud, a germ]: an intermediate layer or layers of cells, derived from the two primitive blastodermic laminæ in all animals above the Cœlenterata.

MESOCÆCUM, n. *mĕs′ō-sē′kŭm* [Gr. *mesos*, middle; Eng. *cœcum*, a portion of the large intestines]: in *anat.*, a duplicate of the peritoneum at the posterior part of the cæcum.

MESOCARP, n. *mĕs′ō-kȧrp* [Gr. *mesos*, middle; *karpos*, fruit]: in *bot.*, the middle of the three layers in fruits.

MESOCEPHALON, n. *mĕs′ō-sĕf′ȧ-lŏn* [Gr. *mesos*, middle; *kephalē*, the head]: in *anat.*, the eminence of transverse fibres between the lobes of the cerebellum. MES′-OCEPHAL′IC, a. *-sĕ-fȧl′ĭk*, of or pertaining to the mesocephalon.

MESOCHILIUM, n. *mĕs′ō-kĭl′ĭ-ŭm* [Gr. *mesos*, middle; *cheilos*, a lip]: in *bot.*, the middle portion of the labellum of orchids.

MESOCOLON, n. *mĕz′ō-kō′lŏn* [Gr. *mesos*, middle; Eng. *colon*, a part of the intestines]: in *anat.*, that part of the mesentery to which the colon is attached.

MESODERM, n. *mĕs′ō-dėrm* [Gr. *mesos*, middle; *derma*, skin]: another name for MESOBLAST, which see.

MESOGASTRIC, a. *mĕs′ō-gȧs′trĭk* [Gr. *mesos*, middle; *gaster*, the belly]: that which attaches the stomach to the walls of the abdomen.

MESOHIPPUS, n. *mĕs-ō-hĭp′ŭs* [prefix *meso-*; Gr. *hippos*, a horse]: genus of fossil *Equidæ*, from the Lower Miocene of N. America.

MESOLABE, n. *mĕs′ō-lāb* [Gr. *mesos*, middle; *labē*, a grip, a hold, a handle]: instrument for the finding of two mean proportionals between two given lines; it was used in solving the problem of the duplicature of the cube.

MESOLE, n. *mĕs′ōl* [Gr. *mesos*, middle]: a mineral of a grayish-white or reddish color, occurring in implanted globules with a flat columnar or fibrous structure. MESOLITE, n. *mĕs′ō-līt* [Gr. *lithos*, a stone]: a mineral, a lime and soda mesotype, of a dead-white or grayish color, occurring in long, slender crystals, and massive.

MESOPHLŒUM, n. *mĕs′ō-flē′ŭm* [Gr. *mesos*, middle; *phloios*, bark]: in *bot.*, the middle layer of the bark.

MESOPHYLLUM, n. *mĕs′ō-fil′lŭm* [Gr. *mesos*, middle; *phullon*, a leaf]: in *bot.*, the whole inner portion or parenchyma of leaves, situated between the upper and under epidermis.

MESOPIC, a. *mĕs-ŏp′ĭk* [prefix *meso-*; Gr. *opsis*, the face, the visage]: term applied to individuals or races having the naso-malar index between 107·5 and 110, as is the case of the negroid races.

MESOPODIUM, n. *mĕs′ō-pŏd′ĭ-ŭm* [Gr. *mesos*, middle; *podēs*, feet]: the middle portion of the foot of mollusks.

MESOPOTAMIA, *mĕs-o-pō-tā′mĭ-a* [Gr. *mesos*, middle; *potamos*, river]: region between the Euphrates and the Tigris; but the name is generally applied to the n. part of this region, called by the Arabs Al-Jesira (the Island). The northernmost districts of M. are mountainous, being penetrated by the s. spurs of the mountains of Armenia; all the rest is a plain, rarely broken by rocky heights. This plain is dry steppe, green with vegetation only in the wet season; but wherever it is naturally watered, or artificially irrigated, it displays fertility. The inhabitants are chiefly Turks, Kurds, Turcomans, and Yesids, with Armenians in the n. and Syrians and Arabs in the plains. The chief occupation of the people is feeding of cattle; and of the civilization of ancient times, or even of that which prevailed in a later period (during the Ayubite rule), few or no traces remain. M. is a part of the Turkish empire, and is divided into several eyalets. For the history of this country, see ASSYRIA: BABYLONIA.

MESOSPERM, n. *mĕs′ō-spėrm* [Gr. *mesos*, middle; *sperma*, seed]: in *bot.*, the second membrane or middle coat of a seed.

MESOSTERNUM, n. *mĕs′ō-stėr′nŭm* [Gr. *mesos*, middle; *sternon*, the breast]: the lower half of the middle segment of the thorax in insects.

MESOTHERMS, n. plu. *mĕs′ō-thėrmz* [Gr. *mesos*, middle; *thermē*, heat]: plants requiring but a moderate degree of heat for their perfect development.

MESOTHORAX, n. *mĕz′ō-thō′răks* [Gr. *mesos*, middle; *thorax*, the breast]: a middle thorax or trunk; the middle part of the thorax in insects.

MESOTYPE, n. *mĕs′ō-tīp* [Gr. *mesos*, middle; *tupos*, form, type]: a mineral prismatic zeolite, a silicate of soda and alumina, occurring abundantly in trap-rocks—known also as *natrolite*.

MESOZOIC, a. *mĕs′ō-zō′ĭk* [Gr. *mesos*, middle; *zōē*, life]: in *geol.*, term designating the group of geological periods whose fossil remains differ equally from those of the Paleozoic (ancient-life) and Cainozoic (newer-life) epochs. It is synonymous with the more usual term Secondary, and includes the stratified rocks of the Triassic, Oolitic, and Cretaceous periods.

MES'PILUS: see MEDLAR.

MESPRISE, n. *mĕs-prīz'* [OF. *mespris;* F. *mépris,* contempt—from L. *minus,* less, and mid. L. *pretĭārĕ,* to prize]: in *OE.,* contempt; scorn; misadventure.

MESQUITE' TREE: see MEZQUITE.

MESQUITE GRASS, *mĕs-kēt',* Sp. *mĕs-kē'tā:* kind of pasture-grass abundant in the s.w. states; of genus *Aristida.*

MESS, n. *mĕs* [OF. *més;* F. *mets,* a service of meat: It. *messa,* a mess of meat—from L. *missus,* sent, in the sense of served up or dished: comp. Gael. *meas,* fruit]: a dish of food; a quantity of food prepared for a certain number of persons; a mixed mass; in the *army* and *navy,* a number of persons who eat together; the food provided for them: V. to eat together at a common table; to supply with a mess. MESS'ING, imp. MESSED, pp. *mĕst.* MESS'MATE, one eating at the same table.

MESS, n. *mĕs* [Ger. *meischen,* to stir the malt in hot water: Gael. *measg,* to mix: OE. *mesh,* a disagreeable mixture: comp. Gael. *musach,* filthy: It. *mescolare,* to mix together]: a mixture disagreeable to the sight or taste; untidiness; disorder; a situation of distress or difficulty. *Note.*—MESS is a corruption of MESH, another form of MASH, which see.

MESS: originally a dish or portion of food; but used in the army and navy in the sense of a number or association of officers or of men taking their meals together. In societies consisting entirely of men, and of one set of men continually thrown together, it is a very important social point that the M. should be well regulated. There are consequently stringent rules—both of the service and of mutual etiquette—for its government. One officer acts as caterer, receives subscriptions from the several members, charges the wine to those who drink it, etc.; a steward has charge of the more menial department, arranging for the cooking, purchase of viands, servants, rations, etc.

In the British army, it is considered necessary for discipline that these messes should be quite exclusive, though, in the armies of continental Europe, and especially the French, the case is different, the utmost familiarity being encouraged between all ranks when off duty. The social equality of officers and men, due to conscription and promotion from the ranks, accounts for this difference of system.

Common seamen and common soldiers, in the navy and army respectively, *mess* together in tables comprising a certain number, according to their rations or squads; but this has no reference to the technical meaning of messing as applied to officers, and is merely for economy of fuel and labor in cooking of rations. See RATIONS.

In the United States the government has furnished the army, through the quartermaster-general, the ordinary articles of provision, but it has long been customary

for sutlers to follow the army and sell various luxuries to the soldiers. The sutlers are subject to martial law and are under strict surveillance. If convicted of wrong they are severely punished. As prices have often been exorbitant and the system tends to cause extravagance on the part of the soldiers, a strong effort was made in 1888 to abolish the sutler's department and establish army canteens (see CANTEEN) for the various regiments and stations, which should be under the direct charge of government, and which should furnish places for social gatherings, and supply to the various messes refreshments at slight advance on actual cost. In 1889 this feature of messing was adopted and, except in cases in which the canteen has degenerated into a saloon, is strongly commended by officers and privates. Its good effects are apparent in the greatly improved quality of the materials furnished and the diminished cost to the purchasers.

In the navy it has long been a cause of complaint by the officers that great expense was involved in obtaining any but the most common articles of food, and especially that the cost of entertainment of visitors, of whatever rank or station, was a heavy and unjust tax on their incomes. In the navies of other countries, particularly in that of Great Britain, an allowance is made by the govt. to commanders of the larger ships to meet the expense of entertaining naval official visitors. The U. S. govt. makes no allowance of this kind, and the cost of entertaining visitors, either at home or in foreign waters, must be borne by the officers of the ships on which the receptions are given.

MESSAGE, n. *mĕs′sāj* [F. *message*—from mid. L. *missatĭcŭm;* OF. *messatge*, a message—from L. *missus*, sent]: any notice or communication, written or verbal, sent from one person to another; an errand; the formal official communication, as from a president to congress, a governor to a legislature, a sovereign to parliament, or from one legislative house to the other. MESSENGER, n. *mĕs′sĕn-jĕr*, the bearer of a message or errand; a harbinger; in a *ship*, a cable used in weighing the anchor. *Note.*—In MESSENGER the *n* is intrusive, and thus stands for *messager;* so *passenger* for *passager*, and *scavenger* for *scavager.*—SYN. of 'messenger': carrier; courier; forerunner; herald; precursor; intelligencer.

MESSALIANS, a. *mĕs-sā′lĭ-anz* [from the Syriac name, those who pray]: same as EUCHITES (q.v.).

MESSALINA, *mĕs-sa-lī′na*, VALERIA: d. A.D. 48; daughter of Marcus Valerius Messala Barbatus, and wife of the Roman emperor Claudius. She was infamous for lasciviousness, avarice, and various atrocities. Taking advantage of the weakness and stupidity of the emperor, she played the adulteress without restraint, and unrelentingly caused all to be put to death who stood in the way of her unhallowed gratifications. The best blood of Rome flowed at her pleasure. Among her vic-

ims were the daughters of Germanicus and Drusus, Justus Catonius, M. Vincius, Valerius Asiaticus, and her confederate Polybius. She went so far in vice as to offer her charms for sale like a common prostitute; and at last, during a temporary absence of the emperor, she publicly married one of her favorites, C. Silius, upon which Narcissus, one of the emperor's freedmen, represented to him that M. was aiming at his destruction, and received orders that she should be put to death. This sentence was executed by Enodus, a tribune of the guards, in the gardens of Lucullus. Her name has become a by-word for lust and crime.

MESSA'NA: see MESSINA.

MESSAPIA, *mĕs-sā'pĭ-a:* Greek name for the Roman Calabria, peninsula in s.e. Italy: see CALABRIA: BRUTTIUM.

MES'SENGERS, KING'S (QUEEN'S): officers employed by British secretaries of state to convey dispatches at home and abroad. In former days, their occupation consisted, to a considerable extent, in serving the secretaries' warrants for apprehension of persons accused of high treason and other grave offenses against the state; frequently they kept the prisoners whom they apprehended at their own houses. They are now employed principally in foreign service.

MESSENGERS-AT-ARMS, in Scotland: officers who execute the process and letters of the courts of session and justiciary. They number at present about 100, and are appointed by, and are under the control of, the Lyon King-at-Arms (q.v.).

MESSENIA, *mĕs-sē'nĭ-a:* district in the s.w. of the Peloponnesus, bounded e. by Laconia, n. by Arcadia and Elis, and s. and w. by the sea. It was composed chiefly of extensive plains, watered by the *Pamisus* and other streams. Those plains were famous for fertility, particularly for their wheat-harvests. At an early period, after the Doric conquest, M. rose to power and opulence. Its chief cities were Messene, Methone, and Pylos. It is noted chiefly for its two wars with Sparta, known as the Messenian Wars: the first (according to the common chronology) B.C. 743 to 724; the second B.C. 685 to 668. In both wars the Messenians were defeated, and, in consequence, a great part of them emigrated to Sicily, where they took possession of Zancle, which then received the name of Messana, the present Messina. After 300 years, Epaminondas invited their descendants back to Greece, and they joyfully responded to his invitation. —M. is the name of one of the *nomarchies* of the modern kingdom of Greece.

MESSERVE, NATHANIEL: soldier and ship-builder: b. Portsmouth, N. H.; died 1758, June. He was lieut.-col. of the regt., under Col. Moore, which in 1744–5 New Hampshire furnished to aid in the siege of Louisburg, on the coast of Nova Scotia, from which point expedi-

tions had been sent to prey upon the commercial and fishing interests of the colonies. M. was the trusted and valiant leader of the N. H. soldiers in the defense of Fort Edward and the attack on Crown Point. In 1758 he started with the second expedition against Louisburg, but before reaching the scene of operations was stricken with small-pox and died. His son, GEORGE, held various govt. offices in N. H. and Mass., refused to join the patriots in their struggle for independence, and in 1777 sailed for England.

MESSIAH, n. *mĕs-sī′ȧ* [Heb. *mashiach*, anointed—from *mashach*, to anoint]: Christ, the Anointed; the Savior. MESSI′AHSHIP, n. the office of the Messiah. MESSIANIC, a. *mĕs′sĭ-ăn′ĭk*, pertaining to the Messiah. MESSIAS, n. *mĕs-sī′ȧs*, the Messiah.—*Messiah*, equivalent to the Greek *Christos*, the Anointed, designates, in the Old Testament, the mighty leader, deliverer, and Savior, the promised One from God—of whose coming the Hebrew nation was expectant through many ages. In the later Jewish history, when the nation was bowed under a foreign and heathen yoke, the Messiah was looked and longed for, not only to restore their country to the power and splendor of the days of David and Solomon, but even, by compelling the Gentiles to acknowledge the supremacy of the theocratic people, to raise it to the summit of universal dominion. The oldest biblical records in their Messianic indications refer rather to the high degree of prosperity which the chosen people were to expect *for themselves* under Messiah's reign. This expectation, already visible in the Abrahamidæ, appeared as for a moment to have realized itself in the conquest of Canaan; but the subsequent, often disastrous wars (in the period of the 'Judges' and of Saul), as well as the internal feuds and dissensions of the Hebrews themselves, left it in fact unfulfilled. Nevertheless, the hope of the appearance of the M. had rooted itself strongly in the people, and, during the glorious and peaceful reigns of David and Solomon, had so grown and enlarged, that even after the secession of Israel from Judah, and during the momentous ages that elapsed until the destruction of the Jewish kingdom, it was confidently expected that God would raise up a 'branch from the stem of David' as the M., the founder of the national prosperity, and the bringer-in of the all-embracing theocratic sovereignty. That branch was declared to be 'the anointed of the Lord,' and, since David applied that epithet to himself, the Jews transferred it to the deliverer whom they expected, and called him 'Son of David.' The prophetic writings contain many such allusions to the M., whose coming was expected shortly, and even during the time of the generation then living, whose birthplace, in congruity with his Davidic descent, was announced to be Bethlehem, and who, it was believed, was to be endowed with the attributes of God. These prophetic allusions are commonly termed MESSIANIC PROPHECIES. Together with such expectations the proph-

exclusively applicable to him. The historico-spiritual school, represented in Germany by men like Neander, Rothe, Tholuck, etc.—and in England and America, generally speaking, by the divines of the 'Broad Church' party—occupy a middle position, yet not so strictly a compromise between, as a combination of, these two extremes: with the rationalists, they hold that the Old Testament doctrine of the Messiah was gradually developed, contains many human elements, and might not necessarily have implied a knowledge of the historical Jesus on the part of those who announce it; with the 'orthodox,' on the other hand, they assert that the doctrine is the expression of a fact, not of a sentiment—that Jesus of Nazareth was actually the Son of God, the appointed Messiah, and that in him the so-called Messianic prophecies were fulfilled in a far higher sense than ever the prophets could have dreamed. It will thus be seen that the rationalists interpret the doctrine of the Messiah as essentially a subjective religious idea; while the orthodox and the historico-spiritual school hold that the doctrine was the expression of a divine fact—the substance of a heavenly faith.

Increasingly, however, the tendency grows of interpreting the Messianic mission of Jesus in terms of world-relationships. What Jesus did which belonged to a single age is held to be subordinate in importance to that which he continues to do. The view of the opening verses of the Acts of the Apostles that the earthly ministry of Jesus reveals only that 'which Jesus began both to do and to preach,' and of the Apostle Paul, that the real and essential knowledge of Jesus is that of his power to reproduce the Christlike character in men of every generation, leads to a shifting of emphasis from Jesus as the Messiah of the Jews to Jesus as the Savior of the world. The local, the national, the incidental, however true and in their time important, grow relatively less before the essential, the permanent and the universal. Under the influence of convictions such as these, the Christian conception of the Messiah grows broader than that from which the idea was derived; and he who was born King of the Jews is considered as the desire of all nations.

MESSIEURS, n. plu. *mĕs'yĕrz* [F. plu. of *monsieur*]: sirs; gentlemen; contracted MESSRS. *mĕs'ĕrz*, which is used as the plu. of Mr.; put before the designations of firms or commercial houses that conduct their business under more than one name, when speaking of them or addressing them by letter, as *Messrs.* Wm. Blackwood & Sons, *Messrs.* T. B. Campbell & Co. See MASTER.

MESSINA, *mĕs-sē'nâ:* province in n.e. Sicily, separated from the mainland of Italy by the Strait of Messina—a separation attributed to an earthquake before the historic period. The province includes the Lipari Islands; its Sicilian coast is on the Ionian Sea; and Mt. Etna marks

its s.w. boundary. Area 1,768 sq.m. Pop. (1901) 543,809. See SICILY.

MESSI'NA: city of Sicily, chief town of the province of Messina; one of the most ancient and most important cities of the island; charmingly situated on the Strait of Messina, encircled by a zone of abrupt conical rocks, commanding a view of Calabria. The town is inclosed by old walls, and has several fine squares and wide lava-paved streets. The harbor, formed by a projecting tongue of land curved in the form of a sickle (whence its primitive name, Zancle—Gr. sickle: see MESSENIA), is about 4 m. in circumference, and can contain a thousand ships; it is defended by a citadel and six forts; the depth is sufficient to admit vessels of large size; and the quays are spacious. The trade of Messina, chiefly in silk, oil, wine, coral, fruits, linseed, fish, etc., though less extensive than formerly, is still an important source of wealth to Sicily. The chief imports are cotton and woolen manufactures, hardwares, and other colonial products. The damasks and satins of Messina are excellent, and the fisheries important. Messina has steamboat communication with Naples, Marseille, and Malta. In the 15th c., Messina was a renowned seat of learning; and in the 16th c. a famous school of painting was founded there by Pelidoro da Caravaggio. In modern times, it has undergone terrible vicissitudes, having been ruthlessly bombarded by the royal forces on several occasions during the war of independence 1848. Pop. (1901) 149,778.

MESSI'NA, STRAIT OF [It. *Faro di Messina;* Lat. *Mamertinum fretum*]: between Italy and Sicily, 22 m. in length, and 2½ to 10 m. wide. A strong current runs through the strait, which is of great depth. See SCYLLA AND CHARYBDIS.

MESSMER, SEBASTIAN GEBHARD, D.D., D.C.L.: American Roman Catholic prelate: b. Goldach, Switzerland, 1847, Aug. 29. He attended the high school at Rorschach and later the College of Saint George near Saint Gall, afterward entering the University at Innsbruck, Austria. Ordained a priest 1871, July 23, he landed in New York the following October and was appointed professor of theology in Seton Hall College, retaining the position until 1889, in which year he became professor of canon law at the Catholic University, Washington, D. C. On Dec. 14, 1891, he was preconized bishop of Green Bay, Wis., being consecrated 1892, Mar. 27, and assuming charge of his diocese 1892, Apr. 7. He was elevated to the archbishopric of Milwaukee, Wis., 1903, Dec. 10, and on Feb. 10, 1904, took possession of his new see. Archbishop Messmer has been actively interested in the Western Summer School, and recently has devoted much time to the study of socialism, upon which subject he has delivered public lectures. He is the author of *Praxis Synodalis* (1883), and *Spinago's Method* (1901), etc. In 1904,

Nov., Pope Pius X. sent the pallium to Archbishop Messmer.

MESSUAGE, n. *mĕs'swāj* [OF. *mesuage*—from mid. L. *mesuāgĭŭm,* a manor-house—from L. *mansus,* a residence—from *manĕō,* I remain, I abide]: in *law,* a dwelling-house and offices, with the land attached; a tenement.

MESTEE, n. *mĕs'tē,* or MUSTEE, n. *mŭs'tē* [Sp. *mestizo,* mongrel: see next entry]: in the *W. I.,* a person of mixed breed; offspring of a white and a quadroon.

MESTIZO, n. *mĕs-tē'zō,* also MESTINO [Sp. *mestizo;* OF. *mestis,* of a mixed race—from L. *mixtus,* mixed]: in Mexico, Central and S. America, the offspring of a Spaniard, or a creole, and a native Indian. The female form is MESTIZA. The offspring of an Indian father and a mestiza is called *mestizo-claro;* of a mulatto and mestiza, a *chino;* of a negro and mestiza, a *mulatto-oscuro.*

MESTRE, *mĕs'trā:* town of n. Italy, province of Venice, 5 m. n.w. of the city of Venice, on the margin of a lagoon. There are many villas around the town, which has a considerable transit-trade. Pop. 4,500.

MET, pt. and pp. of MEET. See MEET 2.

META, *mĕt'ă* [Gr.]: a prefix in words of Greek origin, meaning beyond; after; over; a change or transference.

META, *mā'tâ:* a river of South America, which has its rise on the eastern slope of the Andes Mountains near Bogota in Colombia. It is formed by the junction of two small mountain streams, which unite about 40 miles southeast of Bogota; then flows east-northeast into the Orinoco; a course of about 500 miles.

METABASIS, n. *mĕ-tăb'ă-sĭs* [Gr. *metabăsis,* a transition—from *meta,* beyond; *baino,* I go]: in *rhet.,* a passing from one thing to another; transition.

METABOLA, n. *mē-tăb'ō-la* [Gr. *metabolē,* change—from *meta,* beyond; *bole,* a casting]: a change of some sort, as of air, time, or disease.

METABOLIC, a. *mĕt'ă-bŏl'ĭk* [Gr. *metăbŏlē,* change—from *meta,* beyond; *ballō,* I throw]: pertaining to change or affinity; applied to chemical changes occurring in living bodies. METABOLISM, n. *mĕ-tăb'o-lĭzm,* the process of change which food-stuffs undergo in the body. METABOLIC FORCE, vital affinity.

METABOLISM: this term is used to express the sum of the chemical changes occurring in the animal body and includes anabolism, or assimilation, and katabolism, or disintegration. In perfect equilibrium these two processes exactly balance each other, the amount taken in and utilized by the economy equalling the amount of waste thrown off. When the latter is in excess the body emaciates; when the intake exceeds the output weight increases. In youth the anabolic processes predominate, in old age the katabolic, while in the healthy adult there is metabolic equilibrium. Anabolism is the continuatio

of digestion, the appropriation by the tissues and organs of the nutritive materials prepared for assimilation in the digestive tract. Katabolism is the beginning of excretion, the casting out from the tissues and organs of the used-up and now poisonous materials—the ashes of the animal machine. The disorders of metabolism are those diseases in which the nutritive processes are manifestly at fault; such are gout, diabetes mellitus, and obesity (q.v.).

METABOLISM, n. *mĕ-tăb'o-lĭzm* [Ger. *metabolismus*]: in *theol.*, a term coined by Rückert to describe the doctrinal views of Ignatius, Justin, and Irenæus on the Lord's Supper. They stand midway between transubstantiation and the merely symbolical view, and hold fast to an objective union of the sensible with the supersensible.

METACARPAL, a. *mĕt'ă-kâr'păl* [Gr. *meta*, beyond; *karpos*, the wrist]: pertaining to the part of the hand between the wrist and the fingers. MET'ACARPUS, n. *-kâr'pŭs*, the long bones of the palm of the hand.

METACENTRE, n. *mĕt'ă-sĕn'tĕr* [Gr. *meta*, beyond; *kentron*, the centre]: a certain point in a floating body, on the position of which the stability of the body depends. See HYDROSTATICS.

METACETONE, n. *mĕ-tăs'ĕ-tōn* [Gr. *meta*, change, and Eng. *acetone*]: a colorless liquid of a pleasant odor, obtained by distilling a mixture of sugar or starch and quicklime.

METACHRONISM, n. *mĕ-tăk'rŏn-ĭzm* [Gr. *meta*, beyond; *chronos*, time]: an error in chronology by placing an event after its real time.

METACHRO'SIS: the change of color brought about in the surface of certain animals, either voluntarily or involuntarily, to make them conform to their surroundings. It is exhibited in many of the lower animals as a protective device, especially in cuttlefishes, caterpillars, various amphibians, especially frogs, and certain lizards, notably the chameleons. The dark pigment to which the brown or gray colors of metachroic caterpillars are due is deposited in the cells of the outer skin, while the green coloring matter is found in the underlying fat; and, as Carpenter says, experiments have shown that the presence or absence of both kinds of pigment is determined by the surrounding objects through the quality of the light reflected from them, the suppression of the superficial dark pigment allowing the deeper green to show through the skin, and thus give its hue to the caterpillar. It has been shown that the formation of the dark pigment is hindered by the action of certain yellow rays which are absorbed by dark objects, but reflected from green leaves and shoots.

The process of change in squids, frogs, etc., through nervous and muscular control of pigment sacs, called

chromatophores, is somewhat different, and is explained in the article CHAMELEON. The power possessed by these animals of adapting their color to their surroundings must be of great value in ensuring preservation from enemies. Consult: Beddard, *Animal Coloration* (1892).

METAGE, n. *mē'tāj* [from METE, which see]: measurement of coal; the price of measuring.

METAGENESIS, n. *mĕt'ă-jĕn'ĕ-sĭs* [Gr. *meta,* beyond; *genĕsis,* a beginning]: the changes of form which the representative of a species undergoes in passing, by a series of successively generated individuals, from the egg to the perfect or imago state; the succession of individuals which present the same form only at every alternate generation; alternate generation. METAGENETIC, a. *mĕt'ă-jĕ-nĕt'ĭk,* pertaining to metagenesis; referring to the production of changes in a species after its first origin, as it goes on to a more perfect state.

METAGRAMMATISM, n. *mĕt'ă-grăm'mă-tĭzm* [Gr. *meta,* beyond; *gramma,* a letter]: the change or transposition of the letters of a name into such a position as to express sense in relation to the person named; also called *anagrammatism.*

METAGRAPHY, a. *mē'tăg'ră-fĭ* [Gr. *meta,* beyond, change; *grapho,* I write]: the art or act of rendering the letters of the alphabet of one language into the possible equivalents of another, so as to express the words of the one by the letters of the other as nearly as possible, as, expressing Hebrew characters by English letters; transliteration. METAGRAPHIC, a. *mĕt'ă-grăf'ĭk,* of or pertaining to.

METAKINESIS. See KINESIS.

METAL, n. *mĕt'ăl* [F. *métal,* a metal—from L. *metal'lum;* Gr. *metal'lon,* a mine whence metals are dug, a metal—*lit.,* any hard stuff or material out of a mine]: a body, such as gold, silver, copper, iron, etc., distinguished by its lustre, its opacity, its conductivity of heat and electricity, its fusibility, etc. (see METALLURGY; METALS—NON-METALS); broken stones used for roads; broken glass for the melting-pot. In *her.,* the 'metals' in use are gold and silver, known as or and argent. The field of the escutcheon and the charges which it bears may be of metal as well as of color: and it is a rule of blazon that metal should not be placed on metal, nor color on color: V. to cover, as a road, with broken stones; to make up or mend a road with broken stones. METALLING, imp.: N. *mĕt'ăl-ĭng,* the act of forming the surface of a road with broken stones. METALLED, a. *mĕt'ăld,* covered or laid over with broken stones, as a public road. METALLIC, a. *mĕ-tăl'ĭk,* pertaining to metals; like a metal; consisting of metal. MET'ALLIZE, v. *-īz,* to render metallic; to cover or impregnate with metal. MET'ALLIZING, imp. MET'ALLIZED, pp. *-īzd.* METALLIZATION, n. *mĕt'ăl-ī-zā'shŭn,* the process of forming into a metal.

METALLIST, n. *mĕt'ăl-ĭst*, a worker in metal. METALS, n. plu. the rails on the permanent way of a railway. MET'ALINE, n. *-ĭn*, metallic compound used instead of oil or grease as a lubricant for machinery; invented 1870. METAL-REFINER, a smelter of ores; one who separates copper, lead, or other metal, from the dross or refuse with which it is mixed. THE PERFECT or NOBLE METALS, those which are not easily oxidized, as platinum, gold, and silver. THE BASE or IMPERFECT METALS, those which readily combine with oxygen, as iron, lead, copper, tin, and zinc. MUNTZ METAL, *mŭnts* [after the inventor]: an alloy made into sheets, used for sheathing ships and for other purposes, consisting of 50 per cent. of copper, 41 of zinc, and 4 of lead; also said to be 60 parts of copper and 40 of zinc. METALLIC CURRENCY, the coins forming the circulating medium of a country. WHITE METAL, German or nickel silver.

METAL. See METTLE.

METALEPSIS, n. *mĕt'ă-lĕp'sĭs* [Gr. *meta*, beyond; *lepsis*, a receiving or taking]: in *rhet.*, the union of two or more figures of speech of different kinds in the same word. MET'ALEP'TIC, a. *-lĕp'tĭk*, or MET'ALEP'TICAL, a. *-tĭ-kăl*, pertaining to a metalepsis; transverse; transposed. MET'ALEP'TICALLY, ad. *-kăl-ĭ*.

METALLIFEROUS, a. *mĕt'ăl-ĭf'ĕr-ŭs* [L. *metallum*, a metal; *fero*, I produce]: producing or yielding metals, as strata or districts.

METALLIFORM, a. *mĕ-tăl'ĭ-fawrm* [L. *metallum*, a metal; *forma*, shape]: in the form of metals; like metal.

METALLINE, a. *mĕt'ăl-ĭn* [L. *metallum*, metal (see METAL)]: consisting of metal; impregnated with metal.

METALLOCHROMES, n. plu. *mĕ-tăl'lō-krōmz* [Gr. *metallon*, a mine whence metals are dug; *chroma*, color]: the beautiful prismatic tints produced by depositing a film of peroxide of lead on polished steel by electrolytic action.

METALLOGRAPHY, n. *mĕt'ăl-ŏg'ră-fĭ* [Gr. *metallon*, a mine; *grapho*, I write]: a treatise on metals or metallic substances.

METALLOID, n. *mĕt'ăl-oyd* [Gr. *metallon*, a mine; *eidos*, a form]: a term formerly applied to the non-metallic inflammable bodies, as sulphur, phosphorus, etc.; also applied to all the non-metallic elements (see METALS—NON-METALS). MET'ALLOID, a., or MET'ALLOID'AL, a. *-oyd'ăl*, having the form or appearance of a metal.

METALLURGY, n. *mĕt'ăl-ĕr'jĭ* [OF. *metallurgie*, a search for metal—from Gr. *metallourgos*, mining, working in metals—from *metallon*, a mine, a metal; *ergon*, work]: the art of obtaining metals from their ores; the art of working metals. MET'ALLUR'GIC, a. *-ĕr'jĭk*, pertaining to the art of working metals. MET'ALLUR'GIST, n. *-jĭst*, one whose occupation is to work in metals.

MET'ALLURGY: art of extracting metals from their ores. The operations are partly mechanical and partly chemical. Those processes which depend principally on chemical reactions for their results have reference chiefly to the roasting and smelting of ores: see titles of the different metals. But there are certain preliminary operations of a mechanical kind which metallic ores undergo, such as crushing, jigging, washing, etc., which are here described, as they are essentially the same for the ores of lead, copper, tin, and zinc, and indeed most of the metals. (For IRON, see that title.)

Ores are first broken with hammers into pieces of convenient size for crushing or stamping. Waste materials, such as pieces of rock, spar, etc., which always accompany ore, are as far as possible picked out by hand, and the ore itself is arranged in sorts according to its purity. Various kinds of apparatus, such as riddles, sieves, etc., are then used for separating it into different sizes, to secure a uniform strain on the crushing machinery.

Figs. 1 and 2 represent one of the most approved forms of a crushing-mill. The ore is raised in small wagons, *a*, to the platform *b*, where it is ready to be supplied to the crushing-rollers *r* through the opening *c*. These rollers are mounted in a strong iron frame, held together by wrought-iron bars, and bolted to strong beams. Their distance apart is regulated by the lever *d*, to which a weight *e* is attached. The bearings of the rollers slide in grooves, so that, when any extra pressure is put upon them by a large or hard piece of ore, the

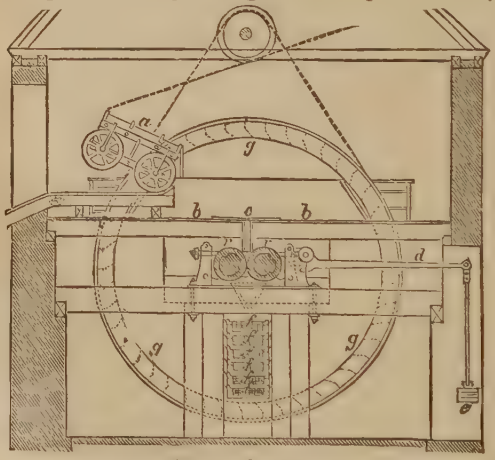

Fig. 1.—Ore Mill:
End view of the crushing-rollers, sieves, and bucket-wheel.

lever rises, and allows the space between the rollers to widen. The crushed ore falls upon a series of sieves, *f*, which are made to vibrate. These have meshes increas-

ing in fineness as they descend; and the upper two are so wide that pieces of ore too large to pass through them

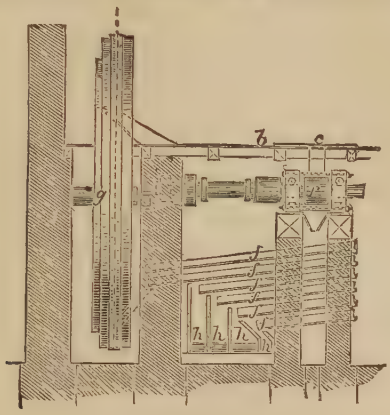

Fig. 2.—Ore Mill:
Side view of the crushing-rollers, sieves, and bucket-wheel.

are conducted into the lower part of the bucket-wheel *g*, and raised again to the platform, to be recrushed. The lower four sieves separate the remaining portion of the crushed ore into different degrees of fineness, and it is collected in the pits *h*.

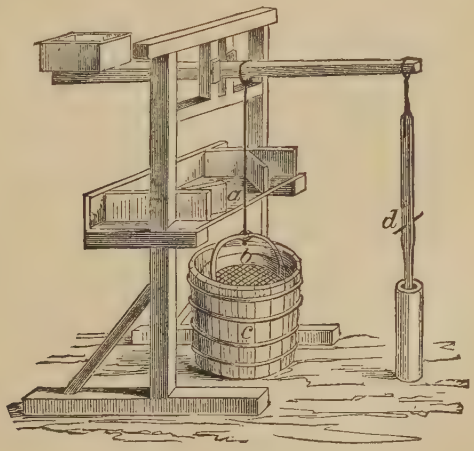

Fig. 3.—Jigging-sieve.

Instead of crushing-rollers, sometimes a stamping-mill is used, especially for tin ores, which require to be reduced to fine powder. The stamping-mill consists of a series of upright shafts with a weighty piece of iron at

the bottom of each. They are raised by means of an axle with projecting cams, and then, falling by their own weight, act like hammers.

After being crushed the ore is washed and sifted on a jigging-sieve. One of the simplest forms is shown in fig. 3. The ore is placed on the table *a*, from which the sieve *b* is filled. It is then immersed in a tub of water *c*, and a jigging motion communicated to it by a workman alternately raising and lowering the handle *d*. This effects two purposes—it washes the ore, and it separates the material into two layers: the upper consists of the lighter spar and other impurities, which are raked off; and the lower consists of the heavier and purer portions of the ore, which are now ready for the roasting furnace.

It will be apparent that in the bottom of the tub there must be a quantity of more or less valuable ore, which, from its fineness, has fallen through the sieve. This is called sludge or slime; and the minute particles of ore that it contains are recovered either by simply forming an incline on the ground, and washing it with a current of water, or by using an inclined table, such as is shown in fig. 4, called a *sleeping-table*. Ore which has been reduced to powder at the stamping-mill, as well as slime, is washed by this apparatus. The material is put into the chest *a*, which is placed in a sloping position, and is supplied with water on turning the stop-cock *b*. The current carries the contents of the chest through the opening at the bottom, and spreads it, with the aid of

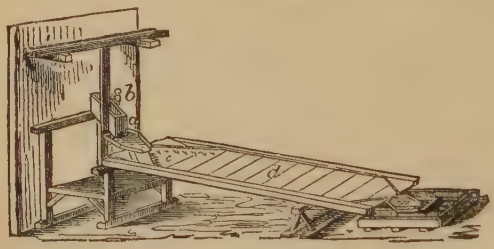

Fig. 4.—Sleeping-table.

a series of stops, or small bits of wood, *c*, over the surface of the table *d*. A stream of water is then kept flowing over the table till all the earthy impurities are carried down into the trough *e*, the pure particles of the ore remaining, by reason of their greater specific gravity, near the top of the table, whence they are removed to be smelted. Sometimes the table is suspended by chains, and receives a succession of blows at the top from a *buffer*, moved by cams on the same principle as the stamping-mill. This arrangement is found of great advantage in dressing very poor ores.

The variety of machinery and apparatus used in dressing ores is very great, and they pass under different names, but they all are very similar in principle.

MET'ALS—NON-METALS: in chemistry, the two great divisions of the elements (see ELEMENT). (For each metal, see its title.) In general, those elements whose oxides give rise to *bases* (q.v.) are called metals, whereas those oxides which produce acids are derived from non-metals. This division is very convenient and corresponds rather closely with differences in the physical properties of the elements in question, but the classification into metals and non-metals is, in many cases, purely arbitrary. It is retained for its practical convenience. Usually metals are distinguished by their peculiar characteristic lustre. This is not exhibited by certain metals when they are in a very finely divided state, but it comes out when the powder is rubbed by a burnisher. A few non-metals also have a lustre. The metals are, as a rule, good conductors of heat and electricity. Silver shows this property to the most marked extent, whereas antimony is almost at the foot of the list. The melting point of the metals is relatively high. Mercury melts at —40° C. and potassium at 62.5° C., whereas platinum and iridium require the high temperature of the oxyhydrogen blowpipe or the electric furnace for their fusion. In density the metals exceed the non-metals. Osmium, the heaviest substance known, has sp. gr. 22.48, whereas that of lithium is only 0.59. The metals show the greatest diversity as regards their hardness, tenacity, etc., but, in general, they excel the non-metals in these attributes. The atomic weights of the metals are usually greater than those of the non-metals. An inspection of Mendeljeff's table of the Periodic System (see CHEMISTRY) will show that, whereas all the elements in groups 1, 2, 3 and 8 are metals, in the remaining groups the metallic characters do not become predominant until the atomic weight is relatively high. Many of the metals have the power of forming *alloys* (q.v.) with other metals. In some cases these are doubtless simple mixtures of the metals in question, but in many instances these alloys have properties so greatly different from those of the constituent metals that they must be regarded as compounds of the metals in question. The more important alloys are described in the articles dealing with the respective elements. The *salts* of the metals are described under the separate headings belonging to them. See also CHEMISTRY.

METAMERIC, a. *mĕt'ă-mĕr'ĭk* [Gr. *meta,* change; *meros,* a part]: in *chem.,* having different characters and properties, but the same ultimate elements and molecular weight with another body.

MET'AMERISM: when two or more chemical compounds have the same empirical formula, but consist of different radicals united by an element (or a radical) that is common to them all, the compounds are said to be 'metameric,' and the property itself is called 'metamerism.' The common element that unites the radicals is

usually oxygen or nitrogen. Good examples of metamerism are afforded by the compound ethers and amines. Dipropyl ether, methyl-amyl ether, and ethyl-butyl ether, for example, all have the empirical formula $C_6H_{14}O$; but dipropyl ether contains two propyl radicals (C_3H_7), methyl-amyl ether contains one radical of methyl (CH_3), and one of amyl (C_5H_{11}), and ethyl-butyl ether contains one radical of ethyl (C_2H_5) and one of butyl (C_4H_9); the two radicals being connected, in each case, by an oxygen atom. The structural formulæ of these respective compounds are therefore as follows:

Dipropyl ether.	Methyl-amyl ether.	Ethyl-butyl ether.
$\begin{matrix} C_3H_7 \\ C_3H_7 \end{matrix}>O$	$\begin{matrix} CH_3 \\ C_5H_{11} \end{matrix}>O$	$\begin{matrix} C_2H_5 \\ C_4H_9 \end{matrix}>O$

The following amines, which all have the empirical formula C_3H_9N, illustrate metamerism in which nitrogen is the connecting element:

Propylamine.	Methylethylamine.	Trimethylamine.
$N\left\{\begin{matrix} C_3H_7 \\ H \\ H \end{matrix}\right.$	$N\left\{\begin{matrix} CH_3 \\ C_2H_5 \\ H \end{matrix}\right.$	$N\left\{\begin{matrix} CH_3 \\ CH_3 \\ CH_3 \end{matrix}\right.$

Metamerism may be regarded as a species of accidental isomerism. When metameric compounds are treated with reagents which destroy the bonds between the constituent radicals and the atoms (of oxygen or nitrogen) by which they are united, the several members of the metameric group that is so treated yield totally different products, because they contain totally different radicals.

METAMORPHIC ROCKS: all rocks, whatever their origin, are subject to change after they are once formed. The term metamorphism is used to include all changes in the nature of rocks that have taken place within the crust of the earth. The rocks thus changed are called metamorphic rocks. Metamorphism may change a rock but slightly, or it may wholly alter the original texture of the rock and its mineralogical composition as well. The forces of metamorphism are dynamic action of some kind, chiefly in the form of pressure, heat and chemical action. The chief agent in making these forces effective is water.

The nature and effect of these forces may be briefly stated as follows: Within the crust, pressure may be due simply to the weight of overlying rocks, or in the upper crust much more intense pressure may result from lateral thrusts, due to the shrinkage of the earth. These thrust movements, which are ordinarily approximately parallel to the surface of the earth, are frequently so great that they cause the crust to buckle up in a series of folds, or it may induce cleavage planes to form at right angles to the pressure, and the rocks may adjust themselves to the pressure by slipping movements along these cleavage planes; often lubricating minerals, such as mica, are

formed on the planes to facilitate the movements. Pressure, also, may cause 'rock flowage,' that is, the constituents of the rock may be rearranged under the tremendous dynamic force applied to them in such a way that they are formed in more or less irregular foliated bands, arranged roughly at right angles to the pressure, each band frequently containing a large percentage of some one given mineral. (Rock flowage, it should be understood, is not flowage in the sense in which the term is applied to liquids, for rock flowage may take place while the rock is solid, but as Van Hise and others have pointed out, it consists in a continual breaking down and reformation of crystals that goes on continually, the process being greatly aided by hot water and pressure.)

This arrangement into a banded structure is termed foliation, or perhaps better, schistosity, and it is a characteristic feature of many metamorphic rocks. The bands are not in horizontal layers, such as characterize sedimentary rocks, but are generally crumpled or folded.

If a sedimentary rock, exhibiting bedding planes should be intensely metamorphosed, the resulting cleavage and schistose structures would not agree with the bedding planes as a rule, but would be formed at an angle to them. The sedimentary structure is apt to be wholly obliterated in extreme metamorphism, and only the secondary metamorphic features remain. The metamorphism due to pressure is termed dynamic metamorphism, and stands in contrast to that produced by chemical means. Dynamic metamorphism is an important assistant to other forms of metamorphism because it tends to crush the rock and to make it more accessible to other agencies. If pressure is relatively slight, the only metamorphism that results may be a slight consolidation of the rock, such as often results from the pressure of superjacent rocks.

Heat is another important agent in metamorphism. The solvent action of water is increased by heat, for instance. Within the crust, heat may be so great that it overcomes the pressure that is present and liquefies the rocks. The molten rock flows here and there, wherever pressure drives it, and wherever the path of least resistance permits it to go. The molten rock bakes the rock, drives off the water contained in it, and originates chemical changes of importance, and may fuse rocks to such an extent that recrystallization takes place. Chemical action, as a metamorphosing force, expresses itself chiefly in the form of solution or deposition from solution. There is a constant interchange of material going on in the deeper seated rocks. The material taken up in one place may be redeposited in another, filling the pores and fissures of the rock, and making it much more compact than formerly. This process of deposition is termed cementation and is an extremely important process, especially in the upper part of the crust, where sandstones,

for instance, may be altered into quartzites by this process.

Water, as an agent in metamorphism, is indispensable. There would be comparatively little metamorphism without it. Water occurs universally in rocks below the level of ground water; it is under any circumstance an important solvent, but when it contains organic acids, carbon dioxide and other chemical substances, its powers of solution are greatly increased. The solvent power of water is also enlarged many fold when it is highly heated or when it exists under great pressure. In the upper zone of rocks, the work of water is largely in the line of solution and redeposition of the solution under some changed circumstance. In the lower zone of rocks where heat and pressure are great, water not only becomes a great solvent but it performs important interchange of material, causing new minerals to be formed by fresh combinations and new crystals to take the place of the old. Water accomplishes this great work chiefly by its power of ionization, that is, its power to disassociate chemical compounds into simpler elements, which are thereby free to make new combinations, and therefore to produce new minerals by reason of the newer combinations. The changes taking place in the lower zone of rocks by reason of ionization is not unlike that caused by electrolysis, in which the electric current resolves a fluid compound into its proximate constituents or 'electrolytes.'

Through the various activities mentioned, rocks are altered or metamorphosed. The metamorphism may be on a large scale, covering even thousands of square miles, where deep-seated rocks, which are thoroughly metamorphosed, have been uncovered by erosion of overlying members: this type of metamorphism is termed regional. In other cases, the metamorphism may be on a small scale, as when a dike of igneous rock is injected into a limestone, for instance, and bakes it in the vicinity of the dike; this type is termed local or contact metamorphism.

According to the structure of the rock, metamorphic rocks may be classified into the stratified metamorphics, and the schistose or foliated metamorphics. In the first group, metamorphism has not wholly obliterated the original characters of the rocks; in the second group the original texture and character has disappeared.

In the case of bedded rocks of the first group, sandstones are usually metamorphosed into quartzites, shales into slates, limestone into marble, bituminous coal into anthracite, or graphite. In the second group are included the foliated or schistose rocks, chiefly the gneisses and schists. The gneisses usually exhibit a banded or foliated structure, and they contain several minerals as a rule. They are closely related to the granites in mineralogical composition and resemble them superficially, but differ

from them in origin and structure. The schists (q.v.) usually have undergone more metamorphism than the gneisses, and they differ from gneiss (q.v.) also in the absence of feldspar (q.v.), that mineral being altered as a rule into sericite or some other form of mica (q.v.). Many of our most beautiful and precious rocks owe their attractiveness in mineralogical and crystalographic characters to the process of metamorphism; this is exemplified in a striking way by the large and varied group of metamorphic rocks classed under the head of marble (q.v.).

METAMORPHOPSIA [Gr. *metamorphopsis,* change, and *ops,* eye]: a term applied to a disease in which a piece of the retina while retaining its vitality is displaced from its proper position. In this case objects which are seen by means of it are seen as they would have appeared from the original position belonging to the displaced retinal element.

METAMORPHOSIS, n. *mĕt'ă-mŏr'fŏ-sĭs,* MET'AMOR'PHOSES, n. plu. *-fŏ-sēz* [L. *metamorphōsis,* a transformation—from Gr. *meta,* beyond, over; *morphē,* form, shape: F. *métamorphose*]: change of form or shape; a transformation (see METAMORPHOSIS): a change in the form of being, as insects (see METAMORPHOSIS OF ORGANS; METAMORPHOSIS OF ANIMALS). MET'AMOR'PHIC, a. *-fĭk,* pertaining to the changes in the earth's strata since their first deposition, by some external or internal agency; applied to the power or force causing the change; a transforming. MET'AMOR'PHISM, n. *-fĭzm,* the state or quality of being metamorphic; the process of transformation; in *geol.,* that change of structure, or of texture, which has been effected on many rocks by the agency of heat, chemical action, or otherwise. METAMORPHOSE, v. *mĕt'ă-mŏr'fōs,* to change into a different form; to transform. MET'AMOR'PHOSING, imp. *-fŏ-sĭng.* MET'AMOR'PHOSED, pp. *-fōsd:* ADJ. changed into a different form; transformed. METAMORPHIC SYSTEM, in *geol.,* those crystalline schists, as gneiss, quartz-rock, mica-schist, and clay-slate, which underlie all the fossiliferous strata, and in which no trace of organic remains has yet been detected. See METAMORPHIC ROCKS.

METAMOR'PHOSIS, in Ancient Mythology: transformations of human beings into beasts, stones, trees, and even into fire, water, etc. The origin and significance of such fables it is often impossible to determine. Some originated, probably, in observation of the wonderful transformations in nature; some in a misapprehension of the metaphors employed by the older poets; and some, perhaps, in mere superstition and love of the marvellous. The wild imagination of the Orientals filled their mythologies with metamorphoses; and the classic mythology approaches them in this respect. They were the theme of some of the poets and other Greek authors of the Alexandrine period, and of Ovid.

METAMORPHOSIS OF ANIMALS: change which certain animals undergo after their escape from the envelope of the egg, and which is of such a nature as essentially to alter the general form or the mode of life of the individual. The most remarkable metamorphoses occur in the Batrachians, Crustaceans, Insects, and Tapeworms (see those titles). The change in insects from ovum to larva is sometimes called *transformation;* while the change from larva to pupa and from pupa to imago is *metamorphosis.* A curious case of metamorphosis is that of Axolotl (q.v.) to Amblystoma.

METAMORPHOSIS OF ORGANS, in Botany: made by Goethe a separate branch of botanical science, and called Morphology—a term now used for the science of organic form (see DARWINIAN THEORY). It may almost be said that nothing was known either of the facts or laws of M. till the poet Goethe proclaimed them to the world in his treatise, *Die Metamorphose der Pflanzen,* 1790. Linnæus had, indeed, called attention to the development of organs and the changes which they undergo, and had made this the subject of a *thesis* entitled *Prolepsis Plantarum* in 1760; but, in a manner very unusual with him, he mixed with his observations and philosophical speculations certain fanciful suppositions, whose fallacy, soon becoming apparent, caused all the rest to be neglected. Wolff afterward extricated the true from the fanciful in the views of Linnæus, and gave them greater completeness; but he introduced the subject only incidentally in a paper on comparative anatomy, which failed to attract the attention of botanists, and probably had never been seen by Goethe, whose discovery, apparently altogether original, is one of the finest instances on record of acute observation combined with philosophical generalization.

For the metamorphosis of organs, see titles of the particular organs. Only a very typical general statement of its facts and laws is here made. A plant is composed of the *axis* and its *appendages*; the axis appearing above ground as the stem and branches, below ground as the root. In certain types, as *Sangrimaria*, the axis is entirely below ground. Most of the appendages above ground are essentially *leaves*, all organs which are not formed of the axis being considered as having the origin and structure characteristic of leaves. The proof of this consists very much in the gradual transition of one organ into another, manifest in some plants, although not in others; as of leaves into bracts, one of the most frequent gradual transitions; of leaves into sepals, as seen in the leaf-like sepals of many roses; of sepals into petals, as seen in the petal-like sepals of lilies, crocuses, etc.; of petals into stamens, as seen in water-lilies; and even of stamens into pistils, often exemplified in the common house-leek. The proof is further confirmed and completed by observation of the monstrosities which occur in plants, particularly in the frequent return of some part of the flower to

its original type, the leaf, and in the conversion of one part of the flower into another, which is often the result of cultivation, and is particularly illustrated in *double* flowers, the increase of the number of petals being the result of the conversion of structures which ordinarily should be stamens into petals.

A flower-bud being a modified leaf-bud (see BUD), and a flower therefore the development of a modified leaf-bud, the parts of a flower correspond in their arrangement with the leaves on a branch. But peculiar laws govern the development of organs in each species of plant. Thus the leaves in one are opposite; in another, alternate; in another, whorled; all depending on the law which governs the growth of the axis in relation to the development of leaves, which is very constant in each species; and in like manner the parts of the flower are developed in whorls around an abbreviated terminal portion of the axis, the energies of the plant being here directed to the reproduction of the species, and not to the increase or growth of the individual. The fruit itself, being formed from the pistil, is to be regarded as formed of modified leaves. Goethe truly says: 'The pod is a leaf which is folded up and grown together at its edges, and the capsule consists of several leaves grown together; and the compound fruit is composed of several leaves united round a common centre, their sides being opened so as to form a communication between them, and their edges adhering together.'

The metamorphosis of organs has been investigated with great diligence and success and more clearly elucidated by Miquel, Schimper, Lindley, von Mohl, Schleiden, Nageli, and other botanists. The study of the morphology and metamorphosis of parts and organs is, at present, of great value because of the enlightenment furnished regarding relationship of plants and plant families.

METAPHOR, n. *mĕt'ă-fŏr* [F. *métaphore*—from Gr. *metaphŏrĕ*, a change of one thing for another—from *meta*, over, change; *phorĕō*, I bear, I carry]: figure of speech expressed in a single leading word; a similitude—for example, 'the man is a lion,' is a metaphor; 'the man is as bold as a lion,' is a simile. Metaphor is an ideal characterization or illustration which may be affirmed by one mind and denied by another, or affirmed and denied by the same mind at different times: it is a kind of comparison, in which the speaker or writer, casting aside the circumlocution of the ordinary similitude, seeks to attain his end at once, by boldly identifying his illustration with the thing illustrated. It is thus of necessity, when well conceived and expressed, graphic and striking in the highest degree, and has been a favorite figure with poets and orators and the makers of proverbs in all ages. Even in ordinary language the meanings of words are in great part metaphors; as when we speak of an *acute* intellect or a *bold* promontory: all such words are *in metaphor*, and the *language* may be

called *metaphorical.* METAPHORIST, n. *mĕt'ă-fŏr'ĭst,* one who uses metaphors. MET'APHOR'ICAL, a. *-fŏr'ĭ-kăl,* or MET'APHOR'IC, a. *-fŏr'ĭk,* not literal; containing metaphor; figurative. MET'APHOR'ICALLY, ad. *-kăl-lĭ.*

METAPHOSPHORIC, a. *mĕt'ă-fŏs-fŏr'ĭk* [Gr. *meta,* over, and Eng. *phosphoric*]: designating phosphoric acid combined with one molecule of water.

METAPHRASE, n. *mĕt'ă-frāz* [Gr. *meta,* over, change; *phrasis,* a phrase]: a verbal or literal translation of a language. MET'APHRAST, n. *-frăst,* one who translates verbally. MET'APHRAS'TIC, a. *-tĭk,* literal; close interpretation.

METAPHYSICS, n. sing. *mĕt'ă-fĭz'ĭks* [Gr. *metaphusĭka,* after those things which relate to external nature—that is, after physics—from *meta,* beyond, after; *phusĭkos,* relating to nature—from *phusis,* nature: F. *métaphysique:* It. *metafisica*]: the science of first principles; the doctrine of the nature of ultimate reality in so far as determinable by an analysis of human experience; a unified interpretation of knowledge. The term metaphysics was first applied to a group of philosophical dissertations of Aristotle (q.v.), either because his writings on what he himself called First Philosophy, Theology or Ontology, came after his physical treatises, or, because, as Aristotle himself said, that which is first in order of being is last in order of knowledge. The term metaphysics has since had various meanings. It may be regarded as a doctrine of first principles in philosophy, and, as such, all philosophical disciplines converge in it. It was customary among older writers to divide metaphysics into three parts, Ontology or doctrine of being, Cosmology or doctrine of the world, and Rational Psychology or doctrine of mind. Lotze (q.v.), and Taylor, a recent English writer, follow this division. On the other hand, the influence of Locke, Hume, and especially Kant, has been to put the problems of the nature, limits, and validity, of human knowledge in the forefront. Some writers deny that metaphysics is a genuine science, even in embryo, and would substitute for it Epistemology or theory of knowledge. But, if any knowledge be valid, it must have to do with reality; and a theory of truth can not be separated from a theory of reality or metaphysics. In such a theory, the outcome of investigation into the problems of knowledge must be correlated with a theory of the world in space and time and with a theory of selves or persons in their social, moral, æsthetic, and religious relations. Such a scheme may be only a programme, but the carrying it out would give a theory of experience in its rational totality, which would be a doctrine of reality for us humans. The relation of mind and body, for instance, is a cardinal problem of metaphysics; but we cannot deal with this problem adequately, without taking account of the ethical and æsthetical phases of

experience, as well as of the character and value of our knowledge of the physical order and of minds. In the problem of the freedom of the will ethical and religious considerations are of central importance. Other central problems of metaphysics are the nature of Time, Space, Causality, Substance, Evolution, Personality, Value, Teleology, Evil, Monism and Pluralism, the Absolute. The literature of metaphysics is coincident with that of philosophy. Recent works are by Bradley, Ward, Royce, Fullerton, Ormond, MacKenzie. MET'APHYS'ICAL, a. *-fĭz'ĭ-kăl:* existing only in thought and not in reality; abstract; pertaining to metaphysics. MET'APHYS'ICALLY, ad. *-kăl-lĭ.* MET'APHYSI'CIAN, n. *-fĭ-zĭsh'ăn,* one versed in the science of metaphysics.

METAPLASM, n. *mĕt'ă-plăzm* [F. *métaplasme*—from Gr. *metaplas'mos,* a transformation—from *meta,* beyond, over; *plasso,* I form]: in *gram.* or *rhet.,* a general term used to embrace all those figures of speech which designate changes in the letters or syllables of a word; in *bot.,* the matter which gives the granular character to protoplasm in a living cell.

METAPODES, n. plu. *mĕt-ăp'ō-dēz* [Gr. *meta,* after, change; *podēs,* feet]: the hind legs.

METAPODIUM, n. *mĕt'ă-pō'dĭ-ŭm* [Gr. *meta,* beyond, after; *podēs,* feet]: the posterior lobe of the foot in mollusca.

METAPOPHYSIS, n. *mĕt'ă-pŏf'ĭ-sĭs* [Gr. *meta,* beyond; *apoph'usis,* a spout, a process]: the mammillary processes of the vertebræ, according to Owen.

METAPTOSIS, n. *mĕt-ăp-tō'sĭs* [prefix *meta-;* Gr. *ptosis,* a falling]: in *med.,* any change in the form or seat of a disease.

METASPERMS, n. plu. *mĕt'ă-spĕrmz* [Gr. *meta,* beyond; *sperma,* seed]: in *bot.,* another name for ANGIOSPERMS, which see.

METASTASIO, *mā-tâs-tâ'ze-o* or *mĕt-a-stâ'ze-o* (originally TRAPASSI), PIETRO: one of Italy's most admired poets: 1698, Jan 6—1782, Apr. 12; b. Rome; of humble parentage. He gave early evidence of genius by his boyish improvisations. Metastasio having attracted the casual notice of Gravina, famous jurisconsult, the latter undertook the entire education and career of the youth, whose paternal name of Trapassi became thenceforward Grecized into Metastasio, both words being identical in signification. The young poet speedily advanced in classical and general knowledge; and to his patron's enthusiastic devotion to the Greek drama may doubtless be traced much of the after-bent of Metastasio's own poetical tastes. By the early death of Gravina, Metastasio was placed in possession of considerable property. In 1724 he published one of his most celebrated dramas, *La Didone,* which, with *Il Catone* and *Il Siroe,* conferred on the poet a European name. In 1730 Met-

astasio accepted the post of poet-laureate to the imperial court of Vienna. During his sojourn in Vienna, Metastasio composed *Giuseppe Riconoscinto, Il Demofonte,* and the *Olimpiade.* He died at Vienna. Metastasio was amiable and attractive in person and manner; he was of somewhat timid disposition. Two persons, after Gravina's death, became so impressed with his talents and attracted by his personal charm, that they practically made him a pensioner on their bounty—one, the great Roman prima-donna Marianna Bulgarelli (called La Romanina); the other, Countess Althann, in Vienna. His works are very numerous, embracing 63 dramas, 48 cantatas, besides numberless elegies, canzonette, sonnets, and translations. They have unexampled popularity among all grades of his countrymen; in their pure classical subjects and forms, the educated student finds instruction and delight; while their facile musical grace and verbal simplicity adapt them to the popular appreciation of the artless beauties of poetry. The best editions of Metastasio are those of Turin (1757, 14 vols.); Paris (1755, 12 vols.); Paris (1780, 12 vols., large 8vo); Genoa (1802, 6 thick vols.); Mantua (1816-20, 20 vols.).

METASTASIS, n. *mĕ-tăs'tă-sĭs* [Gr. *metastăsis,* a change of form or place—from *meta,* over; *stasis,* a placing or setting, a posture]: removal of a disease from one part of the body to another—e.g., rheumatism, gout, mumps, etc., some of which fly from joint to joint, others from the tissues of one organ to the analogous tissue in another kind of organ. The term is also employed to denote the appearance of a secondary malignant growth in some tissue or organ at a distance from the site of the original cancerous tumor. Metastasis is applied also to the removal of food-products, as starch, sugar, etc., from one part of a plant to another.

METASTOMA, n. *mĕ-tăs'tō-mă,* or METASTOME, n. *mĕt'ă-stōm* [Gr. *meta,* after; *stoma,* the mouth]: the plate which closes the mouth posteriorly in crustaceans.

METATARSUS, n. *mĕt'ă-târ'sŭs* [Gr. *meta,* beyond, over; *tarsos,* the sole of the foot]: the part of the foot between the ankle and the toes. METATARSAL, a. *mĕt'ă-târ'săl,* pertaining to the metatarsus or instep: N. the metatarsal bone.

METATHESIS, n. *mĕ-tăth'ĕ-sĭs* [Gr. *metathĕsis,* change—from *meta,* beyond, over; *tithēmī,* I put or place; *thesis,* a placing]: a term designating the transposing of the letters or syllables of a word; in *surg.,* an operation by which a morbific agent is removed from one place to another, where it may produce less disturbance, e.g., in couching for cataract.

METATHORAX, n. *mĕt'ă-thō'răks* [Gr. *meta,* beyond, over, and *thorax,* the chest]: in *insects,* the third and last segment of the thorax—the second being called *mesothorax.*

METAURUS, *me-tâ'rŭs*, or METAURO, *mā-tō'rō*, Italy: a river in the Marches, which flows n.e. past St. Angelo in Vado, and falls into the Adriatic, s.e. of Fano; total course, about 50 m. It is noted for the victory gained by the Romans under the consuls Claudius Nero and Livius Salinator near its banks over the Carthaginians under Hasdrubal 207 B.C.

MÉTAYER, n. *mā-tā'yĕr* [F. *métayer*, a farmer—from mid. L. *mediĕtārĭŭs*—from *mediŭs*, middle]: cultivator of a farm, under stipulation to give the landlord a portion of the produce as his rent. In some older French dictionaries, e.g., that of Trevoux, the word is said to apply to any kind of farmer; but in the oldest dictionary of French and English, Cotgrave's, the word is thus interpreted: 'Properly one that takes ground, to the halves, or binds himself by contract to answer unto him of whom he holds them half, or a great part of the profits thereof.' The term has lately got a meaning in political economy on account of some eminent writers having raised the question, whether this arrangement between landlord and tenant is not so much more advantageous than any other, both to the parties immediately concerned, and to the public at large, that it ought to be specially encouraged. Sismondi appears to have been the first to open this wide view of the influence of the practice, and he has given a chapter to its consideration in his Political Economy (b. iii. chap. 5). He says what cannot be denied, that such an arrangement was a great improvement on mere serfdom, which gave the cultivator no interest in the produce of his industry. But in giving the reasons for his administration of the system as one which provides in the general case for the wants of the peasants while relieving him of all anxiety about markets and prices, he admits that a métayer peasantry never advance beyond the humble, happy, and contented lot which immediately falls to them. It is a system, therefore, inconsistent with the application of large capital to cultivation, and consequently with the extraction of the highest value which the soil can yield.

METCALF, VICTOR HOWARD, LL.B.: lawyer, congressman and executive officer: b. 1853, Oct. 10, at Utica, N. Y. He received his preliminary education at the Utica Free Academy, and Russell's Military Academy, at New Haven, Conn., after which he took a law course at Yale College, graduating in 1876. He was admitted to practice in the Supreme Court of the State of Connecticut the same year, and the following year he was admitted to the New York bar; but in 1878 he removed to Oakland, Cal., where, in 1881, he became a member of the law firm of Metcalf & Metcalf. In 1898, 1900, and 1902, he was elected to Congress as a Republican, from the Third California district; he was secretary of

the Department of Commerce and Labor 1904, July 1—1906, Dec. 16; and since the latter date secretary of the navy.

METCHNIKOFF, *měch'nĭ-kŏf*, ILIYA: Russian cytologist and embryologist: b. in the province of Kharkov, 1845, May 15. He received his early education at Kharkov and later pursued his studies at Giessen and Munich. In 1870 he was appointed to the chair of zoology at Odessa, but after 12 years of labor in that position resigned in order to devote himself to private research, studying particularly sponges and polyps. As a result of this study he published in 1882 a remarkable paper on the intracellular digestion of invertebrates, in which he showed that the individual cells of sponges, in order to provide material on which the young might grow, absorbed solid particles of food and digested them. In 1884 he advanced the theory that the struggle between the white or amœboid corpuscles of the blood and the disease germs within it causes the inflammation in the vertebrates. Metchnikoff subsequently went to Paris, in 1892 became *chef-de-service* in Pasteur's Institute, and upon the death of Pasteur in 1895 became director of the Pasteur Institute. His works include: *Untersuchungen über die intracelluläre Verdauung bei wirbellosen Thieren*, in *Arbeiten aus dem zoologischen Institut der Universität Wien*, vol. V. (1883; ib., 1884); *Ueber die Beziehung der Phagocyten zu Milzbrandbacillen*, in *Virchow's Archiv für pathologische Anatomie und Physiologie*, etc., XCVII., p. 502 (1884; ib., 1892); *Leçons sur la pathologie comparée de l'inflammation* (Paris 1892); *The Nature of Man* (1903); etc.

METE, v. *mēt* [Goth. *mitan;* Dut. *meten*, to measure: OF. *metre*, metre—from L. *metrum;* Gr. *metron*, a measure: L. *metīrī*, to measure]: to measure; to ascertain the dimensions or capacity of by a standard. ME'TING, imp. ME'TED, pp. METER, n. *mē'tĕr*, an instrument that measures, as *gas-meter* (see GAS, LIGHTING BY). METE-STICK, on *shipboard*, a measure used to preserve proper levels in storing cargo.

METELLUS, *mē-tĕl'ŭs:* a Roman family, the most important of the plebian gens Cæcilia, which rose to be one of the first families of the Roman nobility.—One of its most distinguished members was QUINTUS CÆCILIUS METELLUS MACEDONICUS, who received his surname from his victory over Andriscus, an aspirant to the throne of Macedonia (B.C. 148). His life was considered by ancient writers an example of the greatest felicity; before his death three sons had been consuls, one censor. He died B.C. 115.—Another was QUINTUS CÆCILIUS METELLUS NUMIDICUS, who twice defeated Jugurtha in Numidia (B.C. 109), and was noted for integrity, but was superseded in his command by Marius.—His son, QUINTUS CÆCILIUS METELLUS, surnamed *Pius*, joined

Sulla, B.C. 83, but sought to moderate the severity of his proscriptions. He, too, bore a distinguished character for virtue.—QUINTUS CÆCILIUS METELLUS CRETICUS conquered Crete and reduced it to a Roman province (B.C. 67).—QUINTUS CÆCILIUS METELLUS PIUS SCIPIO, sometimes called QUINTUS SCIPIO, and sometimes SCIPIO METELLUS, was son of Publius Cornelius Scipio, who was adopted by one of the Metelli, and became the father-in-law of Pompey, and his zealous partisan. He commanded under him at Pharsalus, maintained war on his behalf for some time in Africa; and after his defeat at Thapsus (B.C. 46), died by his own hand. He was selfish and licentious.

METEMPIRICAL [Gr. *meta,* beyond, and *empeiria,* experience]: that which is beyond or transcendent of experience. A term ascribed to G. H. Lewes.

METEMPSYCHOSIS, n. *mĕ-tĕm'sĭ-kō'sĭs* [Gr. *metempsuchōsis,* the passage of the soul from one body to another—from *meta,* beyond, over; *psuchē,* life]: the passing of the soul of a man after death into the body of another man or into a lower animal, or through a succession of them; transmigration. See TRANSMIGRATION OF SOULS.

METEMPTOSIS, n. *mĕt'ĕm-tō'sĭs* [Gr. *meta,* after; *emptōsis,* a falling upon]: the solar equation necessary to prevent the new moon happening a day too late; the omission of leap-year every 134 years: *proemptosis* is the addition of a day every 330 years, and another every 2,400 years.

METENSOMATOSIS, n. *mĕt'ĕn-sō'mă-tō'sĭs* [Gr. *meta,* change; *en,* in; *soma* or *somăta,* a body]: the change or transmutation of the elements which have formed one body into the substance of other bodies, similar or dissimilar.

METEOR, n. *mē'tĕ-ér* [F. *météore*—from Gr. *metĕōrŏs,* raised high above the earth, sublime: It. *meteora*]: any natural phenomenon or appearance of a transitory nature taking place in the atmosphere; a luminous body or appearance in the sky; a falling star (see METEORS). ME'TEOR'IC, a. *-ŏr'ĭk,* pertaining to meteors; of or belonging to the atmosphere; produced in or falling from the atmosphere; applied figuratively to any person or thing on account of brilliancy or irregularity, or both. ME'TEORIF'EROUS, a. *-ĭf'ér-ŭs* [L. *fero,* I bear]: bearing or producing meteors. METEORITE, n. *mē'tĕ-ŏr-īt,* a stone or body falling from the higher regions of the atmosphere, or from regions without it; also ME'TEOR'OLITE, n. *-ŏr'ō-līt* [Gr. *lithos,* a stone] (see AEROLITE; METEORS). METEOR'OSCOPE, n. *-ō-skōp,* instrument for taking angles, and making measurements of the heavenly bodies. METEOROUS, a. *mē-tē'ō-rŭs,* having the nature of a meteor. METEORIC IRON, the iron found in meteoric stones, principally an alloy of iron and nickel. METEORIC STONES, those masses of hard matter which

frequently fall on the earth from the upper regions; aerolites.

METEOROLOGICAL, a. *mē'tē-ŏr-ō-lŏj'i-kăl* [Gr. *metĕōros*, raised high above the earth; *logos*, a discourse]: relating to the atmosphere and its phenomena; pertaining to a register or table of the state of the air and its temperature, etc.; also ME'TEOROLOG'IC, a. *-lŏj'ĭk*. ME-TEOROL'OGY, n. *-ŏl'ŏ-jĭ*, the science which explains the various phenomena which have their origin in the atmosphere. See METEOROLOGY. ME'TEOROL'OGIST, *-jĭst*, one versed in the various phenomena appearing in the atmosphere. METEOROGRAPH, n. *mē'tĕ-ĕr-ō-grăf*, apparatus for registering meteorological phenomena. METEOROGRAPH'IC, a. *-ō-grăf'ĭk*, pertaining or relating to meteorography. METEOROG'RAPHY, n. *-ŏg'ra-fĭ*, meterology; the registration of meteorological phenomena. METEOROM'ETER, n. *-ŏm'ĕ-tĕr*, in *teleg.*, apparatus for receiving at a local station, transmitting to a central station, by telegraph-wires, and there recording, the direction and velocity of the wind, condition of the barometer and thermometer, and amount of rainfall.

METEOROLOGY: Originally pertaining to all the phenomena that one might observe in the atmosphere or by looking into the sky, has come to mean that important part of natural philosophy that treats of the physics of the air and of the mechanics of its motions; its temperature, moisture, electrification and other properties. That is to say: Meteorology treats of weather and climate; the distinction between the two terms is made plain by the statement that one may speak of the *weather* of to-day, or last month, or some past year, but not of the *climate* of a day, a month, or a year, which is ascertained by a study of continuous weather records for long periods of years. For more details of this subject than are published in this article, see such titles as AEROLITE, ATMOSPHERE, BAROMETER, THERMOMETER, BOILING, CLOUDS, DEW, ELECTRICITY, EVAPORATION, FOG, HAIL, HALO, LIGHTNING, MAGNETISM, METEORS, DUST (meteoric), RAIN, SNOW, STORMS, CYCLONES, etc.

The early philosophers wrote of the weather, but they made little attempt to explain the phenomena that appeared so irregular and capricious. Aristotle, Cicero, Virgil, and a few others wrote on the subject without making any material contributions to the knowledge of the air. They were all ignorant of every department of physical science, and their explanations were, therefore, vague and often absurd. It was impossible to make progress until instruments were invented with which to measure at least the temperature and pressure of the air. In this connection it is interesting to note that at the time of the founding of the first of the thirteen original colonies at Jamestown, Va., in 1607, practically nothing was known of the properties of the air or of the methods of measuring its phenomena. To-day,

at over 200 stations in the United States, Canada, and the West Indies, electrically-recording automatic instruments measure and transcribe, for each moment of time, the air pressure and temperature, the velocity and direction of the wind, the beginning and ending of rainfall, the amount of precipitation, and the duration of sunshine. Every progressive nation is now spending public money to apply our limited knowledge of meteorological science to its various industries, and devoting the talents of some of its ablest scientists to the study of climate with relation to its effect upon health, business, and the products of the soil; and the making of forecasts of coming changes in the weather, with the view of saving life and property that might otherwise be exposed to the fury of storms, or to the withering effects of freezing air or of abnormal heat.

The weather will receive the larger share of our attention. It will be well first to learn something of the physical aspects of the atmosphere.

How Atmospheres are Formed.—Atmosphere (Greek, vaporous sphere). The larger the planet the longer is the time that must elapse before the heavy vapors of earth and metal which largely occupy its atmosphere during the period of its incandescence cool and precipitate into a solid crust, leaving an attenuated residual of such density and constitution as to admit of the beginning of life. Conversely, the smaller a planet is the quicker will its atmosphere reach the conditions of life, the sooner will the life-sustaining fluids be absorbed into its rocks or dissipated into space, and the earlier will a mantle of death, desolation and eternal silence be spread over its face.

The processes of nature are always adding to some of the constituent gases of the atmosphere in some way, and transforming or taking from them in other ways. On the earth, at least, the loss and the gain are so nearly equal as to maintain a nearly constant condition. Marked changes have taken place, however, in long geologic periods. The early atmosphere probably contained large quantities of carbon dioxide which were absorbed by the rank vegetable growth that now forms the coal beds of the earth, and the slowly cooling rocks that constituted the crust. In consequence it may be said that our present atmosphere is what remains after the earth had absorbed of its gases nearly to completion, and after the lighter gases, like hydrogen and helium, which seem to have too great a molecular velocity to be imprisoned by the earth's attraction of gravitation, had been dissipated into space. Somewhat similar processes may be assumed to be taking place on the other planets, or to have taken place.

Gases that could not be held by the moon might be imprisoned by the earth, and those that could escape from the earth might be held by the larger planets. It would appear that the earth's gravitation and the temperature of its outer air are such as to retain, without

appreciable loss, argon, carbon dioxide, oxygen, nitrogen, vapor of water, and ammonia, but that helium and hydrogen escape from the top of the atmosphere about as fast as they are supplied from the hot springs and other sources at the bottom.

Height of the Earth's Atmosphere.—Exact computation has shown that if the air were of the same density at all elevations, which it is not, it would only extend upward to a distance of five miles. From the decreases of density with elevations that have been measured, it is known that only .005 inch of pressure can be exerted by the air at a height of 30 miles, and that at 50 miles the atmosphere must be too tenuous to manifest a measurable pressure; yet it is sufficient at the latter elevation to refract or turn from its initial course an appreciable amount of the sun's rays at sunrise and at sunset, thereby affecting the duration of twilight.

The appearance of meteors, which are rendered luminous by striking into the earth's atmosphere, and whose altitudes have been determined by simultaneous observations at several different places, reveal the presence of air (probably vaporous hydrogen) at a height of nearly 200 miles, but not air of the density or composition of that near the earth.

With increase in elevation beyond 12 miles, we may assume that the heavier gases steadily lose in proportion to the lighter gases, unless the lighter be condensed by cold (as is the case with water vapor at only slight elevations), and their further expansion upward checked, until at about 60 miles nothing but hydrogen remains. Certain it is that heavier gases have a tendency to accumulate in the lower part of any stratum that is not undergoing convectional mixing, such for instance as that next above the turbulent region in which storms operate—and that the lighter gases become relatively greater in the higher regions of steady equilibrium.

Atmospheric Air.—The earth is surrounded by three principal atmospheres and others of less importance, each comporting itself, in accordance with Dalton's law, precisely as it would do if the others were not present, except that its rate of diffusion is retarded by the presence of the others. This composite is *atmospheric air.* It can be easily compressed because there is space between its molecules, which are in constant vibration. The doubling of its pressure reduces its volume one half; this is in accordance with the law discovered independently by Boyle and Mariotte, which is as follows: The temperature remaining the same, the volume of a given quantity of gas varies inversely as the pressure that bears upon it.

According to Regnault, at the temperature of melting ice and at ordinary atmospheric pressure a cubic foot of air that has been freed from water vapor weighs 1.294 ounces. When a mass of air at standard pressure

is heated so as to raise its temperature from the freezing to the boiling point, its volume being confined so as to remain constant, its pressure is increased .36717 atmospheres, which is the mean of the results obtained by several different investigators. According to Wiedemann, the specific heat of air, the pressure remaining constant, is .2389; the volume being kept constant, instead of the pressure, the specific heat is .1715. According to Regnault's determination air expands $\frac{1}{491.4}$ of its bulk for every degree on the Fahrenheit scale. The increase of unit volume for one degree is called the coefficient of expansion. All gases have the same coefficient of expansion, i. e., $\frac{1}{491.4}$ for each increase of one degree Fahrenheit, and the expansion is uniform except at very high and very low temperatures.

Constituent Gases of the Air.—Air is composed almost entirely of oxygen and nitrogen mechanically mixed and not in chemical combination, in which the proportion is about 20.9 parts of oxygen to 78 parts of nitrogen. It should not be thought that because some of the other constituent gases are relatively small in amount they are not vitally important in the carrying on of the functions that nature seems to have assigned to the air. In addition to oxygen and nitrogen, the air contains small quantities of many other substances: vapor of water, carbon dioxide, argon, nitric acid, ammonia, ozone, hydrogen, helium, xeon, crypton, neon, as well as organic matter, germs, and dust in suspension. Over the land it contains sulphates in minute quantities, and over the sea and near the sea shore salt left from the evaporated spray can always be detected.

The relative proportion of the gases of the air is practically the same in all parts of the open country, and nearly the same at all elevations up to the height of ten or twelve miles. In large cities there is an increase of carbon dioxide, and in closed places of public assembly and in mines and in confined areas where considerable combustion—either by fire or by rotting—is taking place there may be a total absence of ozone and a marked decrease in the amount of oxygen and a corresponding increase in the amount of carbon dioxide. The quantity of water vapor in the air may vary from a fraction of one per cent. by weight for the arid regions to five per cent. for the humid regions.

In dry air the general proportion of the gases per 100 parts may be stated to be as follows:

GAS.	By weight.	By volume.
Nitrogen	75.46	78.04
Oxygen	23.19	20.99
Argon	1.30	0.94
Carbon Dioxide	0.05	0.03

The remaining gases that compose the air are relatively too small in quantity to be considered in the making of this statement.

Heat, Light and Temperature.—Light, radiant heat, and electro-magnetic vibrations are simply different

forms of energy. Their identity is shown by the fact that they obey similar laws of propagation, refraction, polarization, interference, and reflection, and that they travel at the same velocity—186,400 miles per second—passing from the sun to the earth in about 8 minutes.

The sun, with an absolute temperature over twenty times as high as the absolute temperature of the surface of the earth, controls the surface temperature of our planet and its atmosphere. To the radiant energy emitted by the sun and as received by the earth is given the special name of *insolation.* It is neither heat nor light while it is being transmitted through space, but simply waves, pulses, or vibrations in the hypothetical continuous ether. About one-half of the solar radiation that falls upon the outer limits of our atmosphere reaches the earth; the remainder is absorbed by the water vapor, and by the dust motes and particles of clouds suspended in the air. The radiation that reaches the earth's surface becomes appreciable to our senses as heat and light.

Distribution of Insolation.—The quantity of heat that falls upon a given area at the top of the earth's atmosphere depends upon three conditions: (1) The altitude that the sun attains when it crosses the meridian at noon; (2) the length of day time, and (3) the distance of the earth from the sun; and these are in a perpetual state of variation, except that near the equator the day and the night are always equal. The distance from the sun varies because the orbit of the earth is an ellipse with the sun in one of its foci; and there is a variation in the time that the sun remains above the horizon each day and the height that it reaches at midday, because the earth's axis is not perpendicular to the plane of its orbit but departs therefrom 23½ degrees, and does not materially change its direction as the earth pursues its annual course.

In consequence of the varying length of the day, the distribution of insolation is not simple. We will first consider what would be the distribution without an atmosphere. The rapidly increasing length of the day towards one of the poles soon more than compensates for the decreasing angle at which the solar rays strike the earth. This is shown by the following table which gives the proportional amount of insolation received in 24 hours at different latitudes and at different times of the year, the amount of insolation received at the equator on March 20th being taken as unity.

PROPORTIONAL AMOUNTS OF INSOLATION.

Latitude	0°	+20°	+40°	+60°	N. Pole +90°	S. Pole —90°
March 20	1.000	0.934	0.763	0.499	0.000	0.000
June 21	0.881	1.040	1.103	1.090	1.202	0.000
Sept. 22	0.984	0.938	0.760	0.499	0.000	0.000
Dec. 21	0.942	0.679	0.352	0.000	0.000	1.284

Such would be the distribution of insolation in the absence of an atmosphere, and probably the conclusion

reached—the large amount of heat received at the pole—was somewhat unexpected. If we now sum up the insolation received at different latitudes during the entire year, it must be remembered that the latitudes which have unusually long days in summer have equally long nights in winter, which makes the calculation of the total amounts received rather a difficult problem. It has been solved, however, by Meech and Angot. The following table gives the total yearly insolation for every 5 degrees of latitude, expressed in thermal days; that is, the unit is the average total daily insolation at the equator, which necessarily receives 365¼ such units a year.

ANNUAL AMOUNTS OF INSOLATION.

Lat.	Thermal Days.	Difference.	Lat.	Thermal Days.	Difference.
5°	364.0	1.2	50°	249.7	20.1
10°	360.2	3.8	55°	228.8	20.9
15°	353.9	6.3	60°	207.8	21.0
20°	345.2	8.7	65°	187.9	19.9
25°	334.2	11.0	70°	173.0	14.9
30°	321.0	13.2	75°	163.2	9.8
35°	305.7	15.3	80°	156.6	6.6
40°	288.5	17.2	85°	152.8	3.8
45°	269.8	18.7	90°	151.6	1.2

Annually the pole receives 41 per cent. of the amount of insolation that reaches the equator, while it would receive no insolation whatever if the axis of the earth were not inclined from the perpendicular to its orbit. The annal insolation varies but little with change of latitude near the equator and near the pole; the most rapid variation occurs between latitude 50° and 60° N.

Quantity of Heat Absorbed by the Atmosphere.—Heretofore we have treated of insolation without taking into account the quantity absorbed by the earth's atmosphere, which varies with the hour of the day and the season of the year; and with the amount of water vapor and clouds and other matter in suspension which affect its transparency.

The effect of the atmosphere upon radiation passing through it is qualitative and quantitative; some of the rays of light are absorbed, others are scattered. When the sun is in the zenith at noon the rays strike the surface perpendicularly and have to pass through the shortest distance possible; but for latitudes far north or south of the equator, the rays are more oblique, and must pass through an ever-increasing thickness of air. Consequently the intensity of radiation at high latitudes decreases not only on account of the greater obliquity of the sun's rays towards the surface, but also because of the longer path of atmosphere traversed, which causes a further loss of heat by absorption and diffuse reflection. Even in our latitudes when the sun is near the horizon its power is so much diminished that one can look at the disk with unprotected eye. Higher latitudes, therefore, on account of the presence of the atmosphere are much more unfavorably situated

with reference to the amount of heat received than was first calculated. Of course the dark rays absorbed by the atmosphere, chiefly those of long wave-length in the infra-red, have effect in warming the air, and in addition the scattering of short waves by diffuse reflection causes the atmosphere itself to become a considerable source of heat, which is of much importance in high latitudes on account of the long duration of twilight.

With a clear sky and a low percentage of humidity not over 75 per cent. of the direct insolation reaches the earth when the sun is vertical, and the amount decreases rapidly with the greater inclination of the rays, especially upon a horizontal surface. The rate of decrease becomes still more rapid with a decrease in the transparency of the air or an increase in the cloudiness.

At best only a fraction of the amount that falls upon the upper air reaches the earth. The value of this fraction depends upon the transparency of the atmosphere and the total mass of air traversed, the latter varying with the obliquity of the rays. The fraction expressing the part that reaches the earth's surface when the sun is in the zenith is called the coefficient of transparency. Considering the whole earth, about one-half of the sun's rays are directly absorbed by the air, and the remaining half reach the earth.

Terrestrial Radiation.—When solar rays are intercepted and absorbed, either by matter in suspension or by the earth itself, the energy of the imponderable ether is transmuted into molecular vibrations of the ponderable matter that absorbs them. The temperature of the matter is raised, and it itself sends out heat rays which, like solar radiation, readily escape from the atmosphere, unless intercepted in their passage by fog, or cloud, or dust, or water vapor. The idea that the clear atmosphere itself acts as a trap for the long waves that are convertible into heat—allowing them to enter but preventing their escape—is not now generally accepted.

The same amount of heat will raise the temperature of a water surface only about one-fourth as much as it will raise the temperature of a land surface. Water rejects by reflection a considerable amount of insolation that reaches it, while land reflects but a small part, and of that that falls upon the top layer of water much is employed in the process of evaporation and does not impart any warmth to the water. Heat so disposed of is said to be latent. These conditions give to large water surfaces and the air immediately over them a much lower temperature during the day and a much higher temperature during the night, and also lower temperatures during summer and higher temperature during winter, than occur over a land surface at the same latitude. This explains the difference between a marine and a continental climate.

Change of Temperature with Latitude and Altitude.—The mean annual temperature at the equator is about 80° F.; and at the north pole zero—a difference of 80° in about 6,250 miles. If instead of moving northward from the equator one were to be carried directly upward, the same difference in temperature that exists between the air at the equator and that at the poles would be found between the air at the surface of the earth and that at an elevation of 27,000 feet, where a temperature of zero probably undergoes slight changes —if any—from one season to another. From the surface upward the annual variations cease at about 35,000 feet; and the diurnal variation at a height of less than 5,000 feet. Generally speaking, along the surface northward from the equator the diurnal variation is known to *decrease* with latitude, and the annual variation to *increase*, except that the annual variation is greater in the north-central parts of the continents of Asia and North America than at the poles, which fact is due to the greater heating and the greater cooling effect of land than of water. The average decrease of temperature with elevation is about one degree Fahrenheit in 300 feet.

Humidity.—The amount of water vapor that the air can contain varies with the temperature. The amount contained is on the average greater during the day and less during the night, although the relative moisture is greater at night because the capacity of air for water vapor decreases rapidly with falling temperature. If the air be near the saturation point, it requires but a slight lowering of the temperature to precipitate a part of its water vapor in the form of dew, frost, rain, snow, or hail. This is the reason that it is usually called water vapor, instead of a gas. Water vapor may vary in amount from a fraction of one per cent. to 5 per cent. of the weight of the air. Its marvelous capacity for the absorption of heat causes it to be an important factor in many meteorological processes. It occupies space nearly the same as though the other atmospheres were not present, practically the same amount being necessary to saturate a given space, whether it be a vacuum or be filled with air, provided the temperature in both cases be the same. With each increase of 18 to 20 degrees in temperature the capacity of air for water vapor is doubled; thus on a cold day in winter it may form no more than 0.001 part of the air, but on a hot day in midsummer near or over large bodies of water it may constitute as much as one-twentieth part by weight of the lower air. The *dew point* is the temperature of saturation. The *absolute humidity* is expressed in grains to the cubic foot; the *relative humidity* in percentages of the amount necessary to saturate, and as previously stated this amount varies with the temperature, doubling for each increase of about 18 degrees.

Climate.—Climates may be broadly divided into marine, continental, mountain, and plain, with the many variations produced as these conditions gradually or precipitately shade off, the one into the other.

If the earth were all water or all land, and if the land were everywhere of the same elevation, most of the factors that cause variations in climates—often considerable for regions closely contiguous—would be eliminated from the equation. Every point on the same parallel of latitude would have the same mean annual temperature, and the same average heat in summer and the same average cold in winter. New York and London, separated by eleven degrees of latitude, would not, as now, have about the same mean annual temperature; and New York would not have warmer summers and colder winters than London. If the surface of the earth were all water there would be no such extremes of heat and cold as we now know. There would be no frost within 35° or 40° of the equator, and zero temperatures would be recorded only in regions within 30° of the poles. If it were all land, the heat would be much more intense than now in the tropics, and in the temperate and frigid zones the heat of summer and the cold of winter would reach extremes unknown at this time.

All the anomalies of climates are caused by the different specific heat capacities of land and water; their different powers of conduction and radiation; the irregular distribution of these two surfaces; the widely-varying elevations of the land; the trend of mountain ranges; the prevailing direction of the winds, and the carrying of large quantities of heat by ocean currents from the equator toward the poles, and the relative quantities of cloud and rain or snow.

Marine climates are warmer in winter and colder in summer than continental climates. In the middle latitudes, land areas that lie on the east of oceans have marine climates on their western sides and for a considerable distance inland, because the atmosphere drifts from the west and partakes largely of the thermal conditions of the surface over which it travels; except where high coastal ranges of mountains intercept the vaporous currents from the ocean, precipitating them upon their ocean side and allowing only the partly dried air to cross the mountain tops into the interior. The Bermuda Islands, in the North Atlantic Ocean, have a mean daily range of temperature of only 10° F., and an annual range of only about 50°; while Memphis, Tenn., near the same latitude in the interior of a large continent, has a daily range of 17° and an annual range of 112°.

All regions bordering closely on the ocean partake of both climates, the predominating one being determined by the direction in which the coasts trend, their elevation, and the direction and force of the prevailing winds.

Change of Climate.—There has been no appreciable change in the climate of any large area within the period covered by authentic history, notwithstanding the popular notion to the contrary. During geologic periods important changes have occurred, but they have taken place so slowly that thousands of years have elapsed before their effect has been appreciable.

Air Pressure and Wind.—Obeying the law of gases, the atmosphere exerts a pressure in all directions. The pressure decreases with increased altitude, because there is less air above the higher the ascent. At sea level, the average pressure of the air is about 15 pounds per square inch, which is sufficient to sustain a column of liquid mercury 30 inches high in the vertical vacuum tube of the barometer. At the height of 16,000 feet, there is only enough atmosphere remaining above to exert a pressure that will sustain the mercury at a height of 16 inches; and at 30 miles high the pressure is calculated to be not over .005 of an inch.

The unequal heating of the atmosphere between the equator and the poles causes the air in the latter regions to expand, rise, and move poleward. These air currents are called wind. There are conflicting currents, as the same amount of air that flows northward must in some manner return to the equator. In this agitation, vortical action occurs, which constitutes the fundamental storm areas that drift eastward in the middle latitudes and westward in the tropics. The velocity with which the wind will move from one region to another bears relation to the difference in the pressure between the two regions, the atmosphere flowing from the region where the pressure is high toward the region where the pressure is less.

Forecasting the Weather and Storms.—It is essential to a comprehension of the problems involved in the making of forecasts that one gain a knowledge of the methods of gathering meteorological observations and making weather reports. Each morning at 8 o'clock—75th meridian time—which, by the way, is about 7 o'clock at Chicago, 6 o'clock at Denver, and 5 o'clock at San Francisco—the observers at about 200 weather bureau stations scattered throughout the United States and the West Indies take their observations, and, with the aid of carefully tested instruments, note the pressure of the air, the temperature, the humidity, the rainfall or snowfall, and the cloudiness. By 8:15 the observations have been reduced to cipher for the purpose of brevity, and each has been filed at the local telegraph office. During the next 30 to 40 minutes these observations are speeding to their destination, each station contributing its own observation and receiving in turn, by an ingenious system of telegraph circuits, such observations from other stations as it may require.

As fast as the reports come from the wires they are entered on blank charts of the United States. One

clerk constructs a chart showing the change in temperature during the preceding 24 hours. A second clerk constructs a chart showing the change that has occurred in the barometer during the past 24 hours. As in the construction of the temperature chart, broad, heavy lines of red separate the regions of rising barometer from those of falling barometer. Narrow lines inclose the areas over which the change in barometer has been greater than one-tenth, and so on. This chart is extremely useful to the forecaster, since it indicates whether or not the storm centers are increasing or decreasing in intensity, and, what is of more importance, it gives in a great measure the first warning of the formation of storms.

A third clerk constructs a chart called the general weather chart, showing for each station the air temperature and pressure, the velocity and direction of the wind, the rain or snowfall since the last report, and the amount of cloudiness. Then lines, called isobars, are drawn through places having the same pressure. By drawing isobars for each difference in pressure of one-tenth of an inch, the high and the low pressure areas are soon inclosed in their proper circles. The word 'High' is written at the center of the region of greatest air pressure, and the word 'Low' at the center of the area of least pressure. Under the influence of gravity the air presses downward and outward in all directions, thus causing it to flow from a region of great pressure toward one of less.

Cyclonic Storms.—The air moves spirally inward toward the center of the cyclone; arriving near the center it ascends and may precipitate rain or snow as it cools by expansion, or as it mingles with air of a lower temperature than its own; in the northern hemisphere it rotates about the center of the low in a direction contrary to the movement of the hands of a watch. The air pressure is less at the center and greater around the periphery of the cyclone. The velocity of gyration of the air as it moves spirally inward will bear direct relation to the difference in pressure between the center of the storm and the region outside of the storm.

Storms are carried along by the general easterly movement of the atmosphere in the middle latitudes of both hemispheres and by the westerly movement of the general circulation in the tropics.

Anticyclonic Storms.—In the anticyclone all the functions of the cyclone are reversed; hence the name. The air has a downward component of motion at and for a considerable distance about the center, instead of an upward component; the winds blow spirally outward from the interior instead of inward; and the air is mostly clear, cool and dry, instead of cloudy, warm and humid.

Winter and Summer Storms.—These are winter conditions that are being described. The storms are general,

not local, as in summer, when the highs (anticyclones) and the lows (cyclones) exhibit small differences of pressure, move slowly, and seldom embrace large areas.

Hot Waves.—For some reason there come, in summer, periods of stagnation in the drift of the highs and the lows. At such times, if a high sluggishly rests over the south Atlantic Ocean between Bermuda and the coast of the United States, and a low over the northern Rocky Mountain regions, there will result what is popularly known as a warm wave, for the air will slowly and steadily flow from the southeast, where the pressure is greater, toward the northwest, where the pressure is less, and, receiving constant accretions of heat from the hot, radiating surface of the earth, without any cyclones to mix the upper and lower strata, will finally attain a temperature almost unbearable to animal life. This superheated condition of the lower stratum in which we live continues until the high over the ocean dies out or drifts away to the east and the low pressure area in the northwest begins to gyrate as a cyclone, moves eastward, mixing in its course strata of unequal temperatures and thus producing the cool and welcome thunder showers.

Twenty five years ago mariners depended on their own weather lore to warn them of coming storms; then, although the number of ships plying the seas was much less than it is now, every severe storm that swept across them left death and destruction in its wake, and for days afterward the dead were cast up by the subsiding waters and the shores were lined with wreckage. Happily this is not now the case.

Cold Waves.—When the charts indicate the formation of a large mass of dense cold air in the northwest, as shown by the barometer readings, the skilled forecaster is on the alert. He calls for special observations every few hours from the stations within and directly in advance of the cold area, and as soon as he becomes convinced that the cold wave will sweep across the country with its attendant damage to property, destruction to animal life, and discomfort to humanity, the well-arranged system of disseminating warnings is brought into action and by telegraph, telephone, flags, bulletins, maps, and other agencies the people in every city, town, and hamlet, and even in farming settlements, are notified of the advancing cold 12, 24, or even 36 hours before it reaches them; and it is safe to say that $10,000,000 is a low estimate to make of the value of the perishable property that is protected in the United States as the result of the warnings that are distributed by the government in advance of the coming of only one of several severe cold waves that occur each winter.

In the late spring and early fall the highs or anticyclones, while possessing less energy than in the winter, may at times bring down to the earth such unseasonably cold air as to cause injurious or destructive frosts, the

frost being caused not necessarily by the cool air of the high, but by the clearness of the air, which allows a free escape of heat from the earth by radiation at night. As in the case of cold waves, warnings of frost are widely distributed, with great profit to the growers of tender fruits and vegetables.

The area and the intensity of cold waves depend upon the size of continents and their distance from the tropics. The interior of North America and of Siberia have geographic conditions that cause the most severe cold waves of any part of the world.

As stated before, the air has a downward movement in the anticyclone, which may be so feeble as to cause only a slight change in temperature at the earth, or it may be active enough to lower the temperature down to the frost line in spring or fall, or even have such energy as to cause a cold wave in winter.

Hurricanes—Most of the storms that gain such a velocity of gyration as to constitute hurricanes originate in the tropics and move northwestward to latitudes 26° to 32°, where they recurve and move toward the northeast. These are the most severe of all the storms that visit the North American continent. The West Indies and the Philippines are the regions wherein these forceful storms originate in the greatest numbers, and the commerce of all nations has profited largely by the spirit that has prompted the United States to establish, since 1898, a complete system of cable-reporting meteorological stations in both of these sections, which enables the central station to keep mariners advised of danger.

At times hurricanes remain several days in the Gulf of Mexico or off our south Atlantic coast, and the only indication we have of their proximity is a strong suction drawing the air briskly over some of our coast stations toward the center of the storm. Again, a heavy ocean swell may be caused by the friction of the rapidly gyrating air on the surface of the water, and when the hurricane has a slow progressive movement, as it usually has, south of latitude 30°, this swell may be propagated outward from the center of the storm faster than the storm is moving and reach the coast several hours before either the barometer or the wind movement gives any indication of the coming storm.

The tracks of the West Indian hurricanes are usually in the form of parabolas. These storms come from the southeast, but on reaching the latitude of our Gulf coast they, as a rule, recurve to the northeast and pass along our coastline or near to it.

West Indian hurricanes are cyclonic in character, but on account of the fact that the diameter of the whirling eddy is much less and the velocity of rotation much greater than in the average cyclone, it is customary to distinguish them as hurricanes. In other words, the hurricane is a cyclone of small area, but of powerful vortical action, and consequently of great destructive force.

Tornadoes.—It is not possible with our present knowledge of the mechanism of storms to forwarn the exact cities and towns that will be visited by tornadoes without alarming some towns that will wholly escape injury; but it is known that tornadoes are almost entirely confined to the southeast quadrant of the cyclone, and that when the thermal, hygrometric, and other conditions are favorable, the spot 300 to 500 miles southeast from the cyclone center is in the greatest danger.

It is desirable to make clear the difference between cyclones and tornadoes. The majority of the press, and many persons who should know better, use these terms as synonyms. A cyclone is a horizontally-revolving disk of air which may be 1,000 or 2,000 miles in diameter, with the air currents from all points flowing spirally inward toward the center; while a tornado is a revolving mass of air of only about 1,000 yards in diameter, and is simply an incident of the cyclone, nearly always occurring in its southeast quadrant. The cyclone may cause moderate or high winds through a vast expanse of territory, while the tornado, with a vortical motion almost unmeasurable, always leaves a trail of death and destruction in an area infinitesimal in comparison with the area covered by the cyclone.

Tornadoes mostly occur between 2 and 5 in the afternoon, and generally move from the southwest to the northeast; their tracks may vary in width from a few hundred feet to one mile; their velocity of translation is usually about that of an express train; their speed of gyration can be measured only approximately, but as it is sufficient often to drive straws a half inch into the bark of trees, it must equal or exceed the velocity of a rifle bullet.

General Principles of Forecasting: The forecaster, when each set of reports is received and charted, notes the position of each storm (cyclone), or cool area (anticyclone). By reference to previous charts he is able to determine the past development of these conditions, their speed and direction of movement, and by studying the distribution of air pressure over a broad area, such as that of the United States, he is able to mark out with a high degree of accuracy the future course and intensity of the two types of weather conditions—the cyclonic and the anticyclonic—the one giving warmer, unsettled, and probably foul weather, the other cool and stable conditions and usually clear weather.

METEORS: luminous bodies or appearances in the sky, or bodies entering the earth's atmosphere from regions of space; see AEROLITE. Of late, it is usual for astronomers and physicists to separate that class of M. known as 'shooting-stars' from the group of *meteorolites* or *meteorites*, on the ground that the most prominent appearances of the shooting stars are *periodic*, while the meteorites seem to occur at irregular intervals, and that the former have hitherto not been *proved* to leave any traces of their visit on the earth's surface. The *British Museum Guide* to the collection of fallen meteoric masses or meteorites, published 1881, divides them into three classes: (1) Aërosiderites or siderites, as consisting mainly of meteoric iron; (2) aërosiderolites or siderolites, conglomerates of iron and stone; (3) aërolites, almost wholly of stone (i. e., various minerals in crystalline condition, usually with a peculiar 'chondritic' or granular structure). It has lately been confidently asserted by one or two observers, that some chondritic meteorites show traces of organic remains—namely, of porous coral. Recent investigations have proved that new-fallen meteorites occlude six times their own bulk of gases, in the proportion of 46 per cent. hydrogen, 32 of carbonic oxide, and 18 of nitrogen. Some M. appear to be dissolved by heat in our atmosphere, and fall to earth in the form of meteoric dust. An attempt was made by Nordenskiöld 1880 to measure the quantity of meteoric dust that fell during a given time upon definite areas of snow along the Arctic Ocean. The amount that fell seems to be much more considerable than was previously imagined.

The star-shower on the night of 1833, Nov. 13, was the grandest ever observed. Another only less brilliant occurred 1866, Nov. 13; this had been confidently predicted, from the occurrence of similar showers at the corresponding date in 1799, 1833, and 1834. The shower commenced about 11:30 P.M., with the appearance at brief intervals of M. singly; then they came in twos and threes, steadily and rapidly increasing in number till 1h. 13m. A.M., Nov. 14, when no fewer than 57 appeared in one minute. From this time, the intensity of the shower diminished gradually, wholly ceasing about 4 A.M. The total number of M. which at that time came within the limits of the earth's atmosphere was estimated at about 240,000, and the number seen at each of the several observatories in Britain averaged nearly 6,000. This star-shower, like those of 1833 and 4, seemed to proceed from the region of the heavens marked by the stars ς and γ in the constellation Leo; the point toward which the earth in her orbit was moving at the time. The M. on that occasion presented the usual variety of color, size, and duration; the great majority were white, with bluish or yellowish tinge; a considerable number were red and orange; a few were

blue; many surpassed the fixed stars in lustre, and some were even brighter than Venus (the most brilliant planet as seen from the earth) at her maximum. Most of the M. left trains of vivid green light 5°–15° in length, which marked their course through the heavens, and endured for 3″ on an average, then becoming dissipated; though some of the trains were almost 40° in length, and remained in sight for several minutes.

In Nov., 1899, another grand display of these M. was generally expected, but the shower failed to appear, for the reason, as subsequent calculations have proved, that the meteoric swarm was drawn aside, after the great spectacle of 1866–67, from its former path in space by the gravitation of Jupiter and Saturn. In consequence this path no longer intersects the orbit of the earth, and a great display of these particular M. may never be seen again. It is now agreed that the November M. move in an orbit round the sun, inclined at about 7° to that of the earth, and that, in all probability, this orbit forms a ring or belt of innumerable small fragments of matter, distributed with very variable density of grouping along it, thus corresponding so far to the Planetoid (q.v.) group between Mars and Jupiter. It is agreed also that the motion of this meteor ring round the sun is retrograde; that the earth's orbit at that point where she is situated on Nov. 13, 14, intersects this ring; and that, probably, in 1799, 1833–4, and 1866–7, it was the same group of M. which was observed; and the last-mentioned hypothesis has been made the foundation of a calculation of the orbit and periodic time of this meteor-ring. The fact that a November star-shower generally occurs two years in succession, and then recurs at an interval of 32 or 33 years, seems to indicate that though the earth may pass through the meteor-orbit every year, the meteors are so grouped at intervals along the ring, and their periodic time differs so much from that of the earth, that it requires 32–33 years before this accumulating difference amounts to a complete revolution of either the earth or the ring, and a repetition of the star-shower becomes possible.

Professor Newton of Yale Univ., who entered into an elaborate investigation of the subject, concluded that the 5 possible periodic times (the earth's being taken as unity) of the meteor-ring were $2 \pm \frac{1}{33\frac{1}{25}}$, $1 \pm \frac{1}{33\frac{1}{25}}$, and $\frac{1}{33\frac{1}{25}}$, and that of these, the fourth, $1 - \frac{1}{33\frac{1}{25}}$ or 354.62 days, was the actual period of its revolution round the sun, and that, consequently, it had described 34 revolutions while the earth had described 33, the cycle of 34 meteor revolutions differing from 33 years by only 3.17 days; and in accordance with this estimate, he calculated its orbit and the approximate extent (seeing the meteor shower generally occurs in two successive years) of the meteor-group which produces the November showers. But Prof. Adams (q.v.) and Alexander Herschel showed that the first four of the possible periods

given by Prof. Newton were *impossible*, and that the last $\frac{1}{33 \cdot 25}$ (i. e., that the meteor-ring makes $\frac{1}{33 \cdot 25}$ of a solar revolution in a year, and one complete revolution round the sun in 33.25 years), was the correct estimate. According to this view, the meteor-group must be so much extended along its ring or orbit as to take more than a year to cross the earth's orbit. A periodic time of 33¼ years, and an orbit which at the same time approaches so near the sun as to insect that of the earth, indicate a path of great ellipticity, akin to those of the comets; and the idea of the cometary nature of these M. derives support from two remarkable facts, the one discovered by Schiaparelli of Milan, that this assumed orbit coincides very nearly with that of the great comet of 1862 (Prof. Adams connects this comet with the August M.), and the other by C. F. W. Peters of Altona, that it coincides with that of Tempel's comet.

Another well-known meteor shower, which, however, exhibits certain irregularities, is that of the Andromedes, so-called because they appear to radiate from the constellation Andromeda. These also appear in November, and are apparently connected with Biela's comet which was dissipated between 1846 and 1872. A third shower, appearing annually on Aug. 10, radiates from the constellation Leo. There are, besides, many minor showers, occurring at various times of the year.

Alexander Herschel maintained that the M. are of recent origin, probably fragments from some of the great luminous bodies, and that though at present assembled in a comparatively dense group, the difference of their relative velocities will have the effect of gradually distributing them all over the meteoric ring, when a November shower will occur every year. Mr. Herschel also carefully observed 20 M. with the view of calculating their weight from the rate of their motion and the amount of heat (as shown by their brightness) evolved in the destruction of their velocity, by the resistance of the atmosphere, and found their weight to vary from 30 grains to 7½ lbs.

The cause of the luminosity of M. was long in dispute, the two chief suppositions being, that the resistance of the atmosphere to a body dashing through it at about 30 m. per second generated so much heat as to produce ignition; while the other was the action of terrestrial magnetism. The point most strongly urged against the first supposition, by the supporters of the second, was, that the height at which meteors were occasionally seen rendered any action of the atmosphere impossible; but as this objection was founded on the purely hypothetical opinion that the atmosphere did not extend more than about 50 m. from the earth's surface, it was not very cogent. This problem was handled by Sir John Herschel in an able paper in the *Edinburgh Review* (1848, Jan.), in which he clearly showed that the very high latent heat of the air in the higher and rarer parts of the atmosphere would be sufficient to

cause an enormous development of heat in the event of the air being compressed before a body advancing into it with a 'planetary' velocity. This opinion is now held by almost all eminent men of science. The enormous heat to which the meteor is thus subject produces incandescence, after which, with more or less facility, according to the nature of the materials of which the meteor is composed, the outer portion becomes liquid, and, by the powerful resistance of the air to the meteor's rapid course, is thrown off in a long stream, forming the tail, which, after rapidly losing its velocity, is precipitated to the earth as a fine dust like volcanic ash; while the meteor thus rapidly and constantly diminishing as it flies along in its headlong course, either becomes wholly dissipated into 'tail,' falls to the earth, or makes its way out beyond the limits of the earth's atmosphere, and continues its course. This supposition also gives a plausible explanation of the phenomenon of M. 'bursting,' this being caused by the sudden heating and consequent expansion of the outer part, while the interior is still in the state of intense cold acquired in interplanetary space.

Mr. Lockyer, experimenting with specimens of meteoric stone and iron, found that by varying the conditions of temperature he obtained spectra from meteorites which reproduced the most peculiar features of nearly every variety of spectrum presented by the celestial bodies. His conclusion is that 'all self-luminous bodies in the celestial spaces are composed of meteorites, or masses of meteoric vapor, produced by heat, brought about by condensation of meteor swarms, due to gravity.' Accordingly 'the existing distinction between stars, comets, and nebulæ rests on no physical basis;' they all are meteoric in origin, and the difference between them depends on differences in temperature, and on the closeness to each other of the meteorites composing them. New or temporary stars are produced by the clash of meteoric streams; and most variable stars are simply uncondensed meteoric streams. This theory is an interesting hypothesis not universally accepted by astronomers.

While astronomers and physicists in general have been thus trying to reduce the phenomena of M. to a system, their chemical brethren have not been idle. Public collections of meteoric bodies have been made at Vienna, the British Museum, Paris, Berlin; and private ones by Mr. Greg of Manchester, Baron Reichenbach in Austria, and Mr. Kunz, Prof. Shepard, and others in the United States; and opportunities have thus been afforded of determining the nature of their composition. About one-third of all the known chemical elements have been found in M., the vast majority of these bodies—about 10 to 1—belong to the group of iron M. In these iron forms about 90 per cent. of the mass, and nickel is almost invariably present.

METER, or METRE, n. *mē′tĕr* [OF. *metre*, metre—from L. *metrum;* Gr. *metron*, a measure, a poetical measure: comp. Skr. *mâtram*, the instr. of measuring (see METE)]: in *poetry*, the quality of the measured sound which distinguishes poetry from prose, and whose harmony pleases the ear; the number of syllables in a verse, as of a psalm or hymn. METRICAL, a. *mĕt′rĭ-kăl*, pertaining to meter; having rhythm; consisting of verses. MET′RICALLY, ad. *-lĭ.*—*Meter* is that regulated succession of certain groups of syllables in which Poetry (q.v.) is usually written. A greater or less number of groups forms a *line* or *verse* (Lat. a turning), and in modern languages the verses usually rhyme with one another; though this is not at all essential to the notion of meter: see RHYME: BLANK VERSE. In the classic languages, meter depended on the way in which long and short syllables were made to succeed one another. English meter depends, not upon the distinction of long and short, but upon that of *accented* and *unaccented* syllables. Thus, in the lines,

The cur′few tolls′ | the knell′ | of part′ing day′—
War′riors and | chiefs′, should the | shaft′ or the | sword′—

the accents occur at regular intervals; and the groups of syllables thus formed constitute each a meter, or measure. The groups of long and short syllables composing the meters of classic verse were called *feet*, each foot having a distinctive name. The same names are sometimes applied to English measures, an accented syllable in English being held to be equivalent to a long syllable in Latin or Greek, and an unaccented syllable to a short.

Every meter in English contains one accented syllable, and either one or two unaccented syllables. As the accent may be on the first, second, or third syllable of the group, there thus arise five distinct measures, two dissyllabic and three trisyllabic, as seen in the words—1, fol′ly (corresponding to the classic Trochee); 2, recall′ (Iambus); 3, ter′ribly (Dactyl); 4, confu′sion (Amphibrachys); 5, absentee′ (Anapæst).

These measures are arranged in *lines* or *verses*, varying in length in different pieces and often in the same piece. The ending measure of a line is frequently incomplete, or has a supernumerary syllable; and sometimes one measure is substituted for another. All that is necessary is, that some one measure be so predominant as to give a character to the verse. Constant recurrence of the same measure produces monotony. The following lines exemplify the five measures:

1st Measure.

Rich′ the | treas′ure.
Bet′ter | six′ty | years′ of | Eu′rope | than′ a | cy′cle | of Cathay′.

2d Measure.

Aloft′ | in aw′ful state′.
The prop′er stud′y of | mankind′ | is man′.

3d Measure.

Bird′ of the | wil′derness.
War′riors and | chiefs′, should the | shaft′ or the | sword′.

4th Measure.

The dew′ of | the morn′ing.
O young′ Loch invar′ has | come out′ of | the west′.

5th Measure.

As they roar′ | on the shore′.
The Assyr′ian came down′ | like a wolf′ | on the fold′.

It is instinctively felt that some of these measures are better suited for particular subjects than others. Thus, the first has a brisk, abrupt, energetic character, agreeing well with lively and gay subjects, and also with the intense feeling of such pieces as *Scots wha ha'e.* The second is by far the most usual meter in English poetry; it occurs, in fact, most frequently in the ordinary prose-movement of the language. It is smooth, graceful, and stately; readily adapting itself to easy narrative and the expression of the gentler feelings, or to the treatment of severe and sublime subjects. The trisyllabic meters, owing to the number of unaccented syllables in them, are rapid in their movement, and calculated to express rushing, bounding, impetuous feelings. They are all less regular than the dissyllabic meters. One of them is frequently substituted for another, as in the opening of Byron's *Bride of Abydos:*

Know′ ye the | land′ where the | cy′press and | myr′tle
Are em′blems | of deeds′ that | are done′ in | their clime′;
Where the rage′ | of the vul′ture, the love′ | of the tur′tle—

where each of the three lines is in a different meter. In addition to this irregularity, one of the unaccented syllables is often wanting. For instance, in Mrs. Hemans's poem, *The Voice of Spring:*

I come′, | I come′! | ye have called′ | me long′;
I come′ | o'er the moun′tains with light′ | and song′—

the first line has only one measure of three syllables, although the general character of the versification is trisyllabic.

In a kind of verse introduced by Coleridge, and used occasionally by Byron and others, the unaccented syllables are altogether left out of account, and the versification is made to depend upon having a regular number of accents in the line:

There is′ not wind′ enough′ to twirl′
The one′ red leaf′, the last′ of its clan′,
That dan′ces as oft′en as dance′ it can′
On the top′most twig′ that looks up′ at the sky′.

Here there are four accents in each line, but the number of syllables varies from eight to eleven.

To *scan* a line or group of lines, is to divide it into the measures of which it is composed,

The variety of combinations of meters and rhymes that may be formed is endless; but a few of the more usual forms of English versification have received special names, and these we may briefly notice.

Octosyllabics are verses made up each of four measures of the second kind of meter, and therefore containing eight (*octo*) syllables:

> With fruit′|less la′|bor, Cla′|ra bound′
> And strove′ | to stanch′ | the gush′|ing wound′.

Scott's poems are mostly in octosyllabics, also *Hudibras*, and many other pieces.

Heroic is a term applied to verses containing *five* meters of the second kind, or ten syllables. Heroics either rhyme in couplets, or are without rhymes, constituting blank verse. Many of the chief narrative and didactic poems in the English language are in rhyming heroics; as those of Chaucer, Dryden, Pope, Cowper, etc. Milton's two great poems, Young's *Night Thoughts*, Thomson's *Seasons*, Cowper's *Task*, Wordsworth's *Excursion*, and many others, are in blank heroics. Metrical dramas are almost always in blank verse; in which case there is frequently a supernumerary syllable, or even two, at the end of the line:

> To be, | or not | to be, | that is | the ques|*tion:*
> Whether | 'tis no|bler in | the mind | to suf|*fer.*

In *Elegiacs*, the lines are of the same length and the same measure as in heroics; but the rhymes are alternate, and divide the poem into quatrains or stanzas of four lines, as in Gray's *Elegy*. The Spenserian stanza, popularized by Spenser in the *Fairy Queen*, and much used by Byron, differs from common heroics only in the arrangement of the rhymes, and in concluding with an Alexandrine (q.v.).

Service meter, also called *common meter*, is the form of versification adopted in the metrical Psalms, in many hymns, and other lyrical pieces. From being frequently employed in ballads, this meter is also called *ballad meter*. The first and third lines often rhyme, as well as the second and fourth.

Such are some of the more usual and definite forms of versification. In many poems, especially the more recent ones, so much license is assumed, that it is difficult to trace any regular recurrence or other law determining the changes of meter or the lengths of the lines; the poet seeks to suit the modulation at every turn to the varying sentiments. But it may be questioned whether much of this refinement of art is not thrown away, on ordinary readers at least, who, failing to perceive any special suitableness, are inclined to look upon those violent departures from accustomed regularity as caprice.

For the kind of verse called *Hexameter*, see that title.

METER, ELECTRIC. See ELECTRICAL MEASURING INSTRUMENTS.

METHANE, *mĕth'ān:* also called marsh gas and occasionally methyl hydride, has the formula CH_4. It is the simplest hydrocarbon, and all organic compounds are regarded as being derived from it by substituting various atoms or radicles for more or less of the hydrogen. Methane is found in swamps, being produced by the decay of vegetable matter. It is the chief constituent of the explosive 'fire damp' of the coal mines and is present to a large extent in natural and illuminating gases (see FUEL). Methane can be prepared by synthesis in a variety of ways; perhaps the two most interesting ones are the action of cold water on aluminium carbide, Al_4C_3, giving methane and aluminium hydroxide, and the treatment of heated copper with a mixture of hydrogen sulphide and carbon disulphide vapor, which results in the production of cuprous sulphide, Cu_2S and methane. Methane is also produced by the pyrogenic decomposition of many more complex hydrocarbons. Methane is a colorless, odorless gas; it liquefies at -82° C. under 55 atmospheric pressure and boils at -160° C. under ordinary pressure. The density of the liquid at -164° C. = 0.415; that of the gas at 0° C. and 760 mm. = 8. Methane is slightly soluble in water, more readily in alcohol, and burns with a faintly luminous flame. Its mixture with air or oxygen explodes violently on the application of a light. Electric sparks decompose methane into hydrogen and carbon, and chlorine replaces the hydrogen readily, forming methyl chloride, CH_2Cl_3, methylene chloride, CH_2Cl_2, chloroform, $CHCl_3$ and carbon tetrachloride, CCl_4, in quantities depending on the proportion of chlorine and on the conditions of the experiment.

METHEGLIN, n. *mĕ-thĕg'lĭn* [W. *meddyglyn*—from *medd,* mead; *llyn,* liquor, juice]: a beverage made of honey and water, fermented with yeast, and often spiced; mead.

METHENYL: hypothetical trivalent-radicle, $-\overset{|}{\underset{|}{C}}H$. It occurs in a large number of compounds, such as chloroform, $HCCl_3$; formic acid, $HC\begin{smallmatrix}O\\OH\end{smallmatrix}$, etc., and exhibits the same relation to methylene that this does to methyl, or that methyl itself bears to methane.

METHINKS, v. *mē-thĭngks'* [*me,* and *think*]: it seems to me; it appears to me. METHOUGHT, pt. *mē-thawt',* it did seem to me.

METHOD, n. *mĕth'ŏd* [F. *méthode*—from Gr. *methŏdŏs;* L. *methŏdus,* a proceeding in regular order, a mode —from Gr. *meta,* with, after; *hodos,* a way: It. *metodo*]: a suitable arrangement of things, proceedings, or ideas, to prevent confusion; a regular mode or manner of doing anything; orderly arrangement; system of arrangement peculiar to an individual; order; system; way;

manner. METHODIC, a. *mĕ-thŏd'ĭk*, or METHOD'ICAL, a. *-ĭ-kăl*, arranged or disposed with regularity; orderly; systematic; precise. METHOD'ICALLY, ad. *-kăl-lĭ*. METHODIZE, v. *mĕth'ō-dīz*, to dispose in due order; to reduce to method. METH'ODIZING, imp. METH'ODIZED, pp. *-dīzd*. METH'ODIZATION, n. *-dĭ-zā'shŭn*, reduction to method. METHODIST, n. *mĕth'ō-dĭst*, one of a sect of Christians founded by John Wesley—so called in 1729 from the regularity of their lives and the strictness of their rules; one who observes method. METH'ODISM, n. *-dĭzm*, doctrines and system of the Methodists. METH'ODIS'TIC, a. *-dĭs'tĭk*, or METH'ODIS'TICAL, a. *-dĭs'tĭ-kăl*, relating to method or the Methodists—in this last sense used contemptuously. METH'ODIS'TICALLY, ad. *-kăl-lĭ*.—SYN. of 'method': rule; regularity; course; mode; means; process; custom; fashion; habit; usage; plan; principle.

METHODIST BOOK CONCERN: the oldest important subordinate organization of the Methodist Episcopal Church, founded in 1789. This institution publishes a series of denominational weekly journals whose generic name is *Christian Advocate*, the oldest of which is *The Christian Advocate* in New York. It also publishes the *Methodist Review* (bi-monthly) and *The Epworth Herald* (weekly). It issues periodicals in various languages, books upon all subjects, and in fact does a general book business. There are also papers published in the interest of the churches by local associations, the best known of which are *Zion's Herald* of Boston, Mass., and the *Michigan Christian Advocate* of Detroit.

METH'ODIST CHURCH, FREE: organized 1860, at Pekin, N. Y., by persons who were or had been members of the Methodist Episcopal Church, and who believed the latter church to have fallen away from its original simplicity and spirituality. They declared that members had been received without sufficient evidence of repentance and conversion; that worldly practices and unlawful business were tolerated; that many professed Methodists no longer possessed the direct witness of the Spirit; that they no longer had power over all sin, and not only seldom attained even professedly entire sanctification, but were at variance among themselves in their preaching on this subject; that there was great neglect of discipline; that simplicity of dress had given place to fashion and extravagance; that pews had taken the place of free seats, and choirs had supplanted congregational singing; that sermons were no longer preached, but read; church buildings were erected at extravagant cost; that church fairs were held; and that oath-bound fellowship with irreligious men in secret societies was tolerated and encouraged. While all the articles of faith of the Methodist Episcopal Church are retained by the newer organization, two are added, emphasizing the doctrine of entire sanctification, and that of endless future rewards and punishment. The

profession of the exercise of a saving faith, the laying aside of all superfluous ornaments of dress, abstinence from intoxicating drinks and tobacco, and the promise not to join any society requiring an oath, affirmation, or promise of secrecy, are made conditions of membership in the Free Meth. Church, as is also attendance at class-meetings. The government is conferential; quadrennial, annual, quarterly, and district conferences being held, composed of lay and ministerial delegates in equal numbers. In place of bishops, general superintendents are elected every four years. The official board is retained. District chairmen take the place of presiding elders. Class-leaders are nominated by the preacher in charge, and elected by their classes. Congregational singing is practiced, and religious services have much of the primitive warmth and zeal. In 1905 the church had 1,000 churches, ministers 1,000, and over 28,038 communicants.

METH'ODIST EPIS'COPAL CHURCH: oldest and largest body of Methodists in the United States. Though not formerly organized until 1784, Dec., it originated in 1766 among some Irish immigrants who had settled in New York. For some months their religious fervor waned; but under the appeals of Barbara Heck they formed themselves into a class led by Philip Embury who, in the old country, had been a local preacher. About the same time Robert Strawbridge who had migrated to Md. and formed societies there, and soon afterwards the first circuit was established in Va. The society in the city of New York flourished, and in that city the first chapel in John street was dedicated. In the same year (1868) classes were formed on L. I., in N. J., Del., and Philadelphia. In that city the Methodists purchased from another religious body an unfinished church and completed it. This was the first Methodist church in that part of the country. Wesley hearing of the movement had sent out missionaries, the most noted of whom, Francis Asbury, arrived in 1771 and later was appointed by Wesley supt. of the American societies. The first American conference was held 1773, with 10 preachers, representing 1,160 members of societies. Nearly all the preachers, being of English descent, sympathized with England during the revolutionary war, and returned to the mother country. This was the case with the majority of the English clergy, thus leaving few ordained men to administer baptism and the Lord's Supper, and a movement to provide for this independently of them threatened a rupture of the peace of the church. In 1780 Wesley applied to the bishop of London to ordain one presbyter for the benefit of American Methodists, but was refused. In 1784 Wesley and two other presbyters ordained Thomas Coke, LL.D. as supt., and appointed Asbury as assistant, of the Methodist churches in America. Thereupon a general convention met in Baltimore, 1784, composed of 80 preach-

ers, at which the 'Sunday Service,' the 'Twenty-five Articles' of faith, and an episcopal form of government, with an elective episcopate, were adopted. Asbury was ordained, in due order, deacon, elder, and general supt. Thenceforward the growth of the church was rapid, while its organic structure was modified from time to time to meet exigencies, the plan of a delegated general conference being adopted 1808, and the first general conference held in 1812. Before the close of the 18th c., most of the characteristic features of the church had been clearly defined. Its territory had been divided into annual conferences; the foundations of its benevolent and educational enterprises had been laid; Sunday schools introduced; a publishing house established; and advanced ground taken on the subjects of temperance and slavery.

Doctrine.— The doctrine of the church is defined in the 25 articles, prepared, with the exception of the 23d, by John Wesley, from the 39 articles of the Church of England, with the intention that they should offer a broad basis upon which all evangelical Christians might unite. Its theology is broadly Arminian. Wesley's doctrine of 'assurance,' or 'the witness of the Spirit,' is firmly held, according to which the Holy Spirit 'works upon the soul by his immediate influence, and by a strong, though inexplicable, operation.' His doctrine of 'Christian perfection,' or 'sanctification,' also is very generally held. It is not meant to teach the attainment in this life of an absolute exemption from mistakes, infirmities, and temptations; but only that 'all saints may, by faith, be so filled with the love of God that all the powers of the soul shall be recovered from the abnormal, perverted, sinful condition, and, together with the outward conduct, be controlled in entire harmony with love.' The need of repentance and regeneration is emphasized; stress is laid on the doctrine of justification by faith alone; infant baptism is taught; and, for the rest, the orthodox faith professed by the leading evangelical denominations is held.

Government.— A series of 5 conferences administers the government of the church. The highest authority and sole legislative body is the 'General Conference,' which meets every 4 years. Prior to 1872, it, as well as the annual conferences, was composed of only ministerial delegates. In 1872 the lay element was admitted, and then the general conference consisted of 1 minister for every 45 members of each annual conference, chosen by the ministers, and 2 laymen, chosen by lay electors from the quarterly conferences within the territory of the annual conference. In 1900 the General Conference completed a previous action of the Annual Conference so that the number of lay and clerical delegates became equal, and at the same session, admitted the additional lay delegates who had been provisionally elected. Lay

and ministerial delegates are united as one body, though provision is made for their separate vote whenever one-third of either element demands it. The body is presided over by the bishops. Besides being the court of final appeal, it elects bishops, missionary and educational secretaries, editors of its periodicals, and book agents. The 'Judicial Conference consists of 'triers of appeals,' of whom each annual conference elects 7. It tries bishops, when the triers of 5 annual conferences must unite; and appeals of members convicted in an annual conference, when those of 3 must unite. Its decisions are final, except that law questions may be reviewed by the general conference. The powers of the 'Annual Conferences' are merely administrative. A bishop presides if present, and they are composed of travelling preachers, who are responsible to them, and whose characters are examined each year. Their action is subject to review by the general conference. 'District Conferences' consist of the presiding elder, pastors, local preachers, exhorters, and one steward and Sunday-school superintendent from each charge in the district. The local preachers are licensed by and are responsible to them, being also recommended by them to the annual conferences for admission or ordination. This body also has the case of the general financial, educational, and benevolent interests of the district. The District Conference, however, is optional. The 'Quarterly Conference' is composed of the pastors, local preachers, exhorters, stewards, class-leaders, trustees, and Sunday-school superintendents of a single charge, over which it has supervision. The pastor, class leaders, and stewards of each charge constitute its leaders' and stewards' meeting, which cares for the sick and poor, superintends the discipline, and can recommend for membership and for license to preach or exhort. The membership of each charge is divided into classes, each having its own leader. Besides presiding over the general and annual conferences, the bishops arrange the districts of the presiding elders, ordain deacons, elders, and newly elected bishops, annually station the preachers, and have the general supervision of the temporal and spiritual affairs of the church. Though they are not diocesan, but have a joint jurisdiction over the entire church, since 1872 they have to reside severally within certain districts into which the territory is divided. The presiding eldership is a kind of sub-episcopate, with the duty of oversight and administration in a limited sphere. Their intimate acquaintance with pastors and people in their several districts, and their presidency over the quarterly conferences, enable the presiding elders to be useful counselors and assistants to the bishops, especially in making ministerial appointments. In this work, custom has made them the bishops' advisers, though they have no actual authority in the matter, the bishops alone be-

ing responsible for all appointments. Candidates for the ministry, after two years' probation in itinerant work, and a satisfactory examination in certain prescribed studies, may be admitted to a general conference and ordained deacons. After two years' further trial, they may be ordained elders. Before a candidate for the ministry can be received into full membership he is asked certain questions in the presence of the conference. Certain questions are answered in writing; one of these is: 'Will you wholly abstain from the use of tobacco?' Deacons administer baptism, solemnize marriage, assist elders in administering the Lord's Supper, and perform all the duties of a travelling preacher. Elders, besides all these, also administer the Lord's Supper. Except in this last prerogative, deacons, elders, and preachers have the same functions, and may have charge of a circuit or station. The pastor is the chief executive of the local church; has the care of its interests according to the requirements of the discipline; and is responsible to the annual conference for his ministerial fidelity and his moral character and conduct. Class-leaders are sub-pastors having special oversight of the various classes, with whom they have weekly devotional meetings; they act in subordination to the pastor. Local preachers are members of district and quarterly conferences, and are often useful adjuncts to the 'itinerancy' as a self-supporting body of lay ministers and evangelists. Admission to church-membership is granted after 6 months or more of satisfactory probation; members from other churches are admitted by certificate without probation. Each local society owns its church building, parsonage, etc., which are held by trustees lawfully constituted. A peculiarity in the constitution of the church, which it shares with most other Wesleyan churches, is the 'itinerant system' of limited pastorates. It was instituted by Wesley, and is still in vogue, though it has been considerably modified in recent years. At first, their being many more societies than preachers, Wesley divided the territory into 'circuits,' each comprising a certain number of societies, and appointed a preacher, or 'helper,' for each circuit. Preachers and circuits were changed at first semi-annually, then annually. All appointments are still made each year, but a pastor cannot be appointed to the same charge for more than five years in succession. This five year time limit was established by the general conference of 1888. From 1864 to 1888 the time limit was three years, and from 1804 to 1864 the limit had been two years. In 1900 the General Conference removed the limit making it possible for the bishops to appoint a minister annually to the same church to the close of his active ministry. In the work of evangelization the church has from the beginning been among the pioneers, everywhere keeping pace with the march of population, and usually being the first to appear in every

new field. Equally rapid have been its internal development and the establishment and growth of the various denominational institutions demanded by the times and circumstances. One of the first Sunday schools in the country was organized, 1786, by Bp. Asbury; and, 1790, its conference ordered such schools for the instruction of 'poor children, white and black, in learning and piety,' to be generally established. The Missionary and Bible Soc. of the M. E. Church in America was a result of the labors of John Stewart among the Wyandotte Indians of Ohio in 1816: it was organized in New York city 1819, Apr. 5, and incorporated by legislature of N. Y., 1839, Apr. 9. The following are the statistics of this society (1905): Members in foreign field, 240,765, a gain of 99½ per cent., 1891; Sunday school members, 270,021; value of churches and parsonages, $6,177,179; missionaries, 729; native ordained and unordained preachers, 3,519; local preachers, 1,871; collections for self-support, $186,787. The society also aided in the support of domestic missionaries in the U. S. The receipts of the society for 1820, its first year, were $823.04; in 1905, $1,582,215; annual average for 10 years—1896–1905—$1,336,118. The Woman's Foreign Missionary Society was organized in Boston, Mass., 1869, Mar. 23; approved by General Conference, 1872; incorporated, 1884, Dec. 27. The society has fields of work in China, Japan, Korea, Malaysia, Burma, India, Burgaria, Italy, Mexico, and S. America, and had, (1905) missionaries, 275½ societies, 5,996; members, 160,327; contributions, $470,702. The Woman's Home Missionary Society, whose field is in the U. S., was organized 1880, and had 1905: members, 87,063 and contributions, $428,-899. The Sunday School Union was formed in New York, 1827, Apr. 2; merged with the Bible Sunday Schol Union and Tract Society, 1833; reorganized by General Conference, 1840; incorporated by the legislature of N. Y., 1852, Feb. 4, and charter amended 1864, Apr. 11. The Sunday School Union had (1905) schools, 33,255; officers and teachers, 354,843; scholars, 2,873,172 (an increase of 10 per cent. since 1891); conversions, 150,-623; books and papers circulated in foreign field, 54,642,700 pages. The Tract Society was organized by General Conference, 1852. In (1905) this society printed 1,740,200 tracts, amounting to 12,561,000 pages. The Board of Church Extension was organized by General Conference 1864, May 27. Its report (1905) shows from the beginning $8,688,343, and churches aided, 14,305. The Freedman's Aid and Southern Education Society began its work among the refugees and freedmen during the Civil war. In 1905 this society maintained 45 schools with teachers, 614: students, 11,510. The society has expended $7,819.397 in its work and has property in schools aggregating $1,827,039. The Board of Education is the outcome of the observance of the

centennial year of the church in 1886 and was chartered 1869. Report for 1905 shows students assisted 1,959, about three-fourths of whom are preparing for ministerial and missionary work; total number aided from its beginning 14,025, to the amount of $1,452,314. The church maintains 14 orphan asylums and institutions for children, 10 homes for the aged, and 26 hospitals. The deaconess work of the church originated 1887, and there were (1905) 78 homes and institutions in America, Europe, Asia, and Africa, valued at $3,177,858; licensed deasonesses, 748. The National Associations of Local Preachers was organized in New York, 1858, Oct. 4, had (1905)) a membership of 300, and owns Taylor Univ., Upland, Ind. The educational institutions of the church are (1905) theological schools, 23; with instructors, 117; students, 1,244; value of grounds and buildings, $2,369,440; endowments, $2,225,627; debts, $16,000; colleges and universities 52; instructors, 2,340; students, 33,512; value of grounds and buildings, $15,266,079; endowments, $16,862,719; debt, $2,335,818; classical seminaries, 49; instructors, 504; students, 10,045; value of grounds and buildings, $3,035,303; endowments, $966,773; debt, $205,107; institutions exclusively for women, 9; instructors, 143; students, 1,457; value of grounds and buildings, $1,135,808; endowments, $661,708; debt, $35,000; foreign mission schools, 33; instructors, 383; students, 5,586; value of grounds and buildings, $1,101,800; endowments, $130,867; debt, $76,490; missionary institutions and Bible training schools, 4; instructors, 53; students, 640; value of grounds and buildings, $478,000; endowments, $10,000; normal university, 1; instructors, 62; students, 2,926; value of grounds and buildings, $125,000; endowment, $25,000. Total: Schools, 171; instructors, 3,602; students, 55,410; value of grounds and buildings, $23,511,935; endowments, $20,882,694; debt, $2,668,415. Schools duplicated in the above enumeration 22; instructors, 139; students, 1,496; value of grounds and buildings, $1,733,753; endowments, $1,070,657; debts, $14,000.

The Am. Univ. at Washington, D. C., incorporated 1893, is designed to afford the best and highest instruction in post-graduate and professional courses of study. The univ. buildings, of which some are nearly completed and others begun, occupy the site of Fort Gaines, comprising about 90 acres of ground on an eminence 4 m. from the capitol. The sickness and death of Bishop Hurst, the chancellor, checked its progress. It is, however, from year to year gaining in resources. The Rev. Franklin Hamilton is now (1908) the chancellor. The institution is not yet open for the reception of students.

The general conference of 1892 created a university senate and empowered it to determine the minimum

equivalent of academic work in the educational institutions of the church for graduation to the baccalaureate degree. The senate is composed of 15 educators appointed by the board of education, one from each General Conference district and one at large. It reports quadrennially to the board of education, and that board determines what institutions meet the requirements prescribed by the university senate. The institutions so adjudged can alone be officially recognized by the church as colleges or universities.

The church has publishing houses at New York and Cincinnati, with branches at Boston, Pittsburg, San Francisco, Detroit, Chicago, and St. Louis. Since 1844 the total sales have reached $76,785,907. The official statistics of the M. E. Church for 1905 are as follows: Conferences, 133; mission conferences, 11; missions, 18; bishops, 28; churches, 28,573, valued at $141,669,017; parsonages, 12,487, valued at $23,919,386; ministers, 18,661; local preachers, 13,935; lay members and probationers, 3,148,292; baptisms, children, 91,676; adults, 104,595; Sunday schools, 33,255; officers and teachers, 354,843; scholars, 2,873,172. The church gained in membership (1905) 381,636, or nearly 14 per cent.

The church has no prescribed ritual. Although it sets forth a ritual for use at discretion, the utmost liberty is allowed; so that, while in some churches there is an approach to liturgical forms, in the most there is great simplicity, with free prayer, congregational singing, and participation by the laity, male and female, in the devotional services.

On all moral questions the church has always taken advanced ground. It prohibits its members from 'buying, selling, or using intoxicating liquors as a beverage, signing petitions in favor of granting license for the sale of intoxicating liquors, becoming bondsmen for persons engaged in such traffic, renting property as a place in or on which to manufacture or sell intoxicating liquors, dancing, playing at games of chance, attending theatres, horse races, circuses, dancing parties, or patronizing dancing schools, or taking such other amusements as are obviously of misleading or questionable moral tendency.' In 1784, it declared slavery contrary to the law of God and to the principles of the American revolution, and measures were considered for 'eradicating this enormous evil from that part of the church of God to which we are united.' In 1808 slaveholders were declared ineligible to the office of elder; and, 1816, this ineligibility was extended to all officials. It was on this question of slavery that the division occurred which resulted in the organization of the Meth. Episc. Church, South (q.v.), 1845. During the late civil war the church was positive and outspoken in its official utterances in support of the union, and more than 100,000 of its members entered the Federal armies.

METH'ODIST EPIS'COPAL CHURCH, South. At the general conference of the Methodist Episcopal Church, 1844, two ministers, one of them a bishop, were suspended from office for being slaveholders. Thereupon 13 annual conferences remonstrated through their delegates, on the ground that such action must make the jurisdiction of the general conference over the conferences in the slaveholding states inconsistent with the success of the ministry there. A committee then drew up a plan for a peaceful division of the church. 1845, May 1, convention of the Southern conferences met at Louisville, Ky., and organized the Methodist Episcopal Church, South. It also provided for a meeting of the first general conference, which took place at Petersburg, Va., 1846, May. There the plan of division presented by the conference committee of 1844 was approved, and the property belonging to the whole church was equitably divided according to that plan and with the sanction of the United States supreme court. At its organization the church claimed a membership of about 459,000, of whom 124,961 were colored. The membership by 1860 had increased to 964,971, of whom 207,766 were colored. Through the war not only was its membership largely reduced, but its educational, publishing, and missionary interests were crippled and almost destroyed. In doctrine and polity it is very similar to the Methodist Episcopal Church, though a few changes have been made. Its general conference consists of an equal number of clerical and lay delegates. The annual conferences are composed of the itinerant preachers and 4 lay delegates, one of whom may be a local preacher, from each presiding elder's district. In 1872 the publishing house was burnt down but was soon rebuilt on a much larger scale.

The General Conference organized a General Missionary Board in 1846. The fields of labor are in China, Japan, Brazil, Mexico, and Korea; and reports for 1905-6 are as follows: Missionaries, 99; wives of missionaries, 83; native travelling preachers, 103; native local preachers, 117; members, 17,633; Sunday schools, 362; officers and teachers, 1,182; scholars, 16,533; Epworth leagues, 135; members, 4,939; schools, 62; pupils, 3,691; total value of missionary property, $994,131. The Indian mission had (1896) preachers, 138; local preachers, 186; white members, 15,405; Indian members, 4,111. The Woman's Foreign Missionary Society was organized 1878, May; has fields in China, Mexico, Brazil, also the Indian mission; with (1906) missionaries, 69; teachers, 257; boarding schools, 25; day schools, 56; hospitals, 2. The Board of Church Extension was organized 1882, besides which each annual conference has an auxiliary church extension board, and city boards of extension may be organized in cities that have three or more pastoral charges. The Womans' Home Mission

Society was formed to aid in building parsonages, and for general educational and religious work. The Board of Education has (1906) 203 schools of all grades under its care, with more than 1,612 teachers and 29,090 pupils, and property valued at $10,674,895, with endowments of $3,603,825.

The general statistics of this church for 1906 are as follows: Bishops, 12; travelling preachers, 7,038; local preachers, 4,800; members, 1,656,609—an increase of 9 per cent. over the past year, and the membership has trebled since 1866; Sunday schools, 14,892; teachers, 111,137; scholars, 1,084,238; Epworth leagues, 3,153; members, 141,840; membership of Junior leagues, 13,500.

The Colored Methodist Episcopal Church in America had (1907): Churches, 2,619; preachers, 2,673; members, 219,739.

METH'ODIST PROT'ESTANT CHURCH: organized 1830 by former members of the Methodist Episcopal Church, who for some time previously had expressed dissatisfaction with the government of the church, which they declared was too exclusively in the hands of the itinerant preachers, to the exclusion of other preachers and the lay membership. To effect a change in this respect they published *The Wesleyan Repository* 1820-24, and presented numerous petitions to the general conference 1828. After the meeting of the conference they resolved to publish another periodical, *The Mutual Rights*, for the discussion of the question at issue, and also organized themselves, in Baltimore, into a union society, with the recommendation that others be organized throughout the church, for the purpose of ascertaining how many members were in favor of a change in its government. Some of the agitators were thereupon expelled from the church, 11 ministers and 22 laymen in Baltimore being among the number. These at once organized, under Wesley's general rules, with the title of the 'Associated Methodist Reformers,' 1827, Nov. They petitioned the general conference 1828, for a change in the government, making it more representative, but were refused. Thereupon they withdrew from the church in large numbers in various parts of the country, and called another general convention of the reformers in Baltimore, 1828, Nov. 12, at which a provisional government was formed; and at the Baltimore convention 1830, Nov., a constitution and discipline for the government of the Methodist Protestant Church were adopted. The church agrees with the Methodist Episcopal Church in doctrine, but differs in government. Its general conference meets quadrennially, and consists of delegates elected by the annual conferences, one minister and one layman being chosen for every 1,000 members. As reported in 1907 the church had 1,551 ministers, 2,242 churches, and 183,894 communicants.

METH'ODISTS (British): name originally given, about 1729, by a student of Christ-Church to the brothers John and Charles Wesley, and several other young men of a serious turn of mind, then members of different colleges of Oxford, who used to assemble together on particular nights of the week chiefly for religious conference. The term was an allusion to the exact and *methodical* manner in which they performed the various engagements which a sense of Christian duty induced them to undertake, such as meeting together for the study of Scripture, visiting the poor, and prisoners in Oxford jail, at *regular* intervals. Subsequently, it came to be applied to the followers of Wesley and his coadjutors, when these had acquired the magnitude of a new sect; and though their founder himself wished that 'the very name,' to use his own words, 'might never be mentioned more, but be buried in eternal oblivion,' yet it has finally come to be accepted by most, if not all, of the various denominations that trace their origin mediately or immediately to the great religious movement commenced by John Wesley. For an account of the origin and earlier development of Methodism, see WESLEY, JOHN: WESLEY, CHARLES: WHITEFIELD, GEORGE. The present notice concerns its organization, doctrine, and present condition.

1. *Organization.*—This appears to have been partly improvised by Wesley to suit the exigencies of his position. It was not a theoretical and premeditated, but a practical and *extempore* system. In the *Rules of the Society of the People called Methodists*, drawn up by himself, he says: 'In the latter end of the year 1739, eight or ten persons came to me in London, who appeared to be deeply convinced of sin, and earnestly groaning for redemption. They desired (as did two or three more the next day) that I would spend some time with them in prayer, and advise them how to flee from the wrath to come, which they saw continually hanging over their heads. That we might have more time for this great work, I appointed a day when they might all come together, which from thenceforward they did every week—viz., on Thursday, in the evening.' This he calls 'the first Methodist Society.' Its numbers rapidly increased, and similar 'societies' were soon formed in different parts of England, where the evangelistic labors of the Wesleys had awakened in many minds 'a desire to flee from the wrath to come, and be saved from their sins'—the only condition, we may remark, required of any for admission into these societies. In order to ascertain more minutely how the work of salvation was progressing in individual cases, Wesley subdivided the societies into 'classes,' according to their respective places of abode, each class containing about a dozen persons, under the superintendence of a 'leader,' whose duties are partly religious and partly financial. 1. He has to see each person in his class once a week, 'to inquire how their souls prosper,' and to encourage, comfort, or cen-

sure, as the case may require. 2. To collect the voluntary contributions of his class, and pay them over to the 'stewards' of the society, and to give the ministers all necessary information regarding the spiritual or bodily condition of those under his leadership. For preaching purposes, on the other hand, the societies were aggregated—a certain number of them constituting what is called a circuit. This now generally includes a town, and a rural circle of 10 or 15 miles. To each circuit, two, three, or four ministers are appointed, one of whom is styled the 'superintendent;' and here they labor for at least one year, and not more than three. Every quarter, the classes are visited by the ministers, who make it a point to converse personally with every member; at the termination of which proceeding, a 'circuit-meeting' is held, composed of ministers, stewards, leaders of classes, lay preachers, etc. The stewards (who are taken from the societies) deliver their collections to a circuit-steward, and the financial business of the body is here publicly settled. At this quarterly meeting, candidates for the office of the ministry are proposed by the president, and the nomination is approved or rejected by the members. Still larger associations are the 'districts,' composed of 10 to 20 circuits, the ministers of which meet once a year, under the presidency of one of their number, for the following purposes: 1. To examine candidates for the ministry, and to 'try cases of immorality, heresy, insubordination, or inefficiency on the part of the clergy.' 2. To decide preliminary questions concerning the building of chapels. 3. To investigate and determine the claims of the poorer circuits to assistance from the general funds of the body. 4. To elect a representative to the committee of Conference, whose duty is to nominate ministers for the different stations for the ensuing year—their appointments, however, being subject to the revision of Conference. In all the financial and other purely *secular* business of the districts, laymen (such as circuit-stewards and others) deliberate and vote equally with the clergy. The supreme Methodist assembly is the 'Conference.' The first was held 1744, when John Wesley met his brother Charles, two or three other clergymen, and a few of the 'preachers'—men whom his zeal and fervor had induced to abandon their secular employments and devote themselves to declaring the message of the Gospel. The purpose for which he called them together was, he says, 'for the sake of conversing on the affairs of the "societies," . . . and the result of our consultations we set down to be the rule of our future practice.' In the course of his life, Wesley presided at 47 of these annual assemblies. The Conference now consists of 100 ministers, mostly seniors, who hold their office according to arrangements prescribed in a Deed of Declaration, executed by John Wesley himself, and enrolled in chancery. But the representatives previously mentioned, and all the ministers allowed by the

district committees to attend—who may or may not be members of the legal Conference—sit and vote usually as one body, the 100 confirming their decisions. In this assembly, which is exclusively clerical, every minister's character is subjected to renewed and strict scrutiny, and if any charge be proved against him, he is dealt with accordingly; candidates for the ministry are examined both publicly and privately, and set apart to their sacred office; the entire proceedings of the inferior courts (if we may so call them) are finally reviewed; and the condition, requirements, and prospects of the body are duly considered.

2. *Doctrine and Worship.*—Wesleyan M. claim to be *orthodox*, *Protestant*, and *evangelical*. The propriety of the last two appellations will probably not be disputed, but a rigid Calvinist might object to the first. They accept the *articles* of the English Church, but believing these articles to have been framed on a basis of *comprehension*, they consider themselves at liberty to accept them in an Arminian sense. It must not, however, be supposed that they are out-and-out Arminians. Their great distinguishing doctrine is the universality and freedom of the atonement; hence, they reject the Calvinistic doctrine of predestination and especially of reprobation (which they conceive incompatible with the universal atonement); but while they maintain the freedom of the will and the responsibility of man, they maintain also his total fall in Adam, and his utter inability to recover himself. If these two appear to the human understanding to conflict, it is nevertheless asserted that the Bible teaches both; and it is objected to high Calvinism, that, in its anxiety to be logical, it has shown itself unscriptural. Prominence is given by the Wesleyan M. to certain points of religion, some of which are not altogether peculiar to them. They insist on the necessity of men who profess to be Christians feeling a *personal interest* in the blessings of salvation—i.e., the assurance of forgiveness of sins and adoption into the family of God. This, however, is not to be confounded with a certainty of *final salvation*. They believe the Spirit of God gives no assurance to any man of that, but only of *present pardon*. In harmony with this view, they reject the doctrine of the necessary perseverance of the saints, and hold that it is fearfully possible to fall from a state of grace, and even to perish at last after having 'tasted of the heavenly gift,' and having been 'made partakers of the Holy Ghost.' They also maintain the perfectibility of Christians, or rather the possibility of their entire sanctification, as a privilege to be enjoyed in this life. But Wesley 'explains' that 'Christian perfection does not imply an exemption from ignorance or mistake, infirmities or temptations; but it implies the being so crucified with Christ as to be able to testify, "I live not, but Christ liveth in me."' He regards the sins of a 'perfect' Christian as 'involuntary transgressions,' and does not think they should be called 'sins' at all, though

he admits that they need the atoning blood of Christ. The Wesleyan Methodists in their religious services use more or less the English liturgy; the morning service being read in many of their chapels, and the sacramental offices being required in all. They observe a 'watch-night' on the eve of the New Year, on which occasion the religious services are protracted till midnight, and their chapels are generally crowded to excess; and in the beginning of the year they hold a 'covenant-service,' at which the congregations stand up (though this form is not invariable), and solemnly vow to serve the Lord. But even the ordinary religious services in some places are frequently marked by an ebullition of fervent feeling on the part of the audience, which has a very singular effect upon a stranger.

3. *History.*—The earlier history of Methodism was for many years the history of Christian effort to evangelize the neglected 'masses' of England. The noble labors of Wesley, and of those whom he inspired to imitate his example, met remarkable success. The reformation of life which his preaching produced, for example, among the Kingswood colliers and the Cornwall wreckers, is a testimony to the power of religion which cannot be too highly estimated. The zeal which has inspired the body in regard to foreign missions, although in the highest degree honorable, is only the logical development of their efforts at home—for they originally regarded their society in England as simply a vast 'home mission,' and neither Wesley nor his followers desired to consider themselves a 'sect,' a new church in the common usage of the term, but were warmly attached to the old national church, and considered themselves among her true children. When Wesley died (1791), his 'societies' had spread over the United Kingdom, the continent of Europe, the United States, and the West Indies, and numbered 80,000 members. Since then, they have largely increased, official statistics of 1906 showing 620,350 communicants in England and Wales. Other Methodist bodies in England and Wales comprised about 540,000 communicants. The number of adherents over the world is estimated at about 19,000,000.

The Wesleyan Methodists have three theological colleges for the training of ministers—one at Richmond Hill, Surrey, a second at Didsbury, s. Lancashire, and a third at Headingley, in Yorkshire, besides the establishments at Sheffield and Taunton; two schools for education of sons of Wesleyan ministers (New Kingswood School and Woodhouse Grove School); and two for the daughters, one at Clapton and another at Southport. The boys receive a six years' and the girls a four years' course of instruction. Attention is given also to elementary education, and their schools received 1879 a government grant of £96,700. The Methodist Book-room is in the City Road, London, and issues hun-

dreds of thousands of religious publications (tracts, etc.) monthly. The newspapers and other periodicals professedly in connection with the body include four quarterlies and about 150 journals in English and other languages. Among the more eminent Methodist authors may be named the two Wesleys, Fletcher, Benson, Clarke, Moore, Watson, Drew, Edmondson, Sutcliffe, Jackson, Teffry, Rule, Nichols, Smith, and Etheridge.

The corresponding denomination in the United States, one of the greatest of Protestant denominations, is the METHODIST EPISCOPAL CHURCH (q.v.). Also, see other 'METHODIST' denominations under their titles; also WESLEYAN METHODIST CONNECTION of America: AFRICAN METHODIST EPISCOPAL CHURCH: AFRICAN METHODIST EPISCOPAL ZION CHURCH.

Returning to the English Wesleyan Methodists, we notice the various secessions from the parent body in the order of time:

1. METHODIST NEW CONNECTION.—This society detached itself from the older one 1797. Its founder was Alexander Kilham (1762-98), who was received by Wesley into the regular itinerant ministry 1785. When, after Wesley's death, there was controversy whether the Wesleyans should continue their submission to the established church, Kilham urged that they should administer the sacraments as well as preach the word, and that they should separate entirely from the Church of England. Kilham urged also admission of the lay element to a share in government. The controversy grew acrimonious, and resulted in his expulsion from the society, and the formation of the New Connection. Its doctrines and order are the same as those of the old, the only difference being that it admits one layman to each minister into the Conference, and allows them to share in the transaction of all business, both secular and spiritual. These laymen are chosen either by the circuits or by 'guardian representatives' elected for life by the conference. In 1906 the numbers of the New Connection were: Members and probationers, 45,816; ministers, 205, and lay preachers, 1,238.

2. PRIMITIVE METHODISTS, vulgarly designated RANTERS, were first formed into a society 1810, though the founders had separated from the old society some years before. The immediate cause of this separation was a disagreement as to the propriety of camp-meetings for religious purposes; and also on the question of females being permitted to preach. A third point of difference is the admission to their conference of two lay delegates for every minister. In 1906, there were 199,241 communicants.

3. INDEPENDENT METHODISTS, who separated 1810; distinguished chiefly by their rejection of a paid ministry. They number 9,732 in England and Scotland.

4. BIBLE CHRISTIANS, called BRYANITES also, were

formed by a local preacher named Bryan, who seceded from the Wesleyans 1815. The only distinction between them and the original body appears to be that the Bible Christians receive the eucharistic elements in a sitting instead of kneeling posture. In 1906, their numbers were, members and probationers, 33,373; ministers, 210, and lay preachers, 1,528.

5. UNITED FREE CHURCH METHODISTS have been recently formed by the amalgamation of two sects of nearly equal numerical strength. The older of these, the WESLEYAN ASSOCIATION, originated 1834 in the removal of one or two influential ministers from the original connection. Points of difference subsequently appeared with regard to the constitution of the Conference. —The younger sect, the WESLEYAN REFORM ASSOCIATION, took its rise 1849, through the expulsion of several ministers from the parent body on a charge of insubordination, and being founded on the same principles as the last-mentioned community, arrangements were entered into for their union, which was subsequently effected. Church independency and freedom of representation in the annual assembly are two of the prominent distinctive traits in the organization of the *United Methodist Free Church.* Their united numbers in 1906 were, members and probationers, 101,820; ministers, 448, and preachers, 3,449.—The *Wesleyan Reform Union* consists of 8,700 members, who have not amalgamated with the Methodist Free Churches.

WELSH CALVINISTIC METHODISTS are not a secession from the followers of Wesley, but originated partly in the preaching of his friend and fellow-evangelist, Whitefield, and partly in that of Howel Harris, a Welsh clergyman of the Church of England. Whitefield was a Calvinist; Wesley was on some points decidedly Arminian. A difference arose between them on the subject of election, and thenceforward their paths lay in different directions. Whitefield, however, did not form a religious sect; and after his death (1769), his followers, being left without any distinct bond or organization, either followed the leading of the Countess of Huntingdon (q.v.), or became distributed among other denominations, a large portion, especially in Wales, becoming absorbed in the new society gradually forming itself through the preaching of Howel Harris and his coadjutors. They became a separate body 1810, and have now about 175,000 communicants. See CALVINISTIC METHODISTS.

The *Canadian Methodist Church* had (1901) 847,765 members and probationers.

Three of the above mentioned churches—the Methodist New Connection, the United Methodist Free Church, and the Bible Christians—have united under the name of United Methodist Church, and since 1907 have had a united conference as a governing body.

METHOMA'NIA. See DIPSOMANIA.

METHOUGHT. See under METHINKS.

METHUEN, *mĕ-thū'ĕn*, PAUL SANFORD, Baron: English general: b. Corsham Court, Wiltshire, 1845, Sep. 1. He is descended from Sir Paul Methuen, who effected the treaty, named after him, between England and Portugal in 1703. He studied at Eton; entered the Scots Guards in 1864; saw special service on the Gold Coast in 1873; received a medal for bravery in the Ashanti campaign in 1874; became attaché in Berlin (1877), assistant quartermaster-general Home District (1881), and quartermaster-general in Egyptian war (1882); won a C. M. G. in Bechuanaland (1885); was in command of the Home District from 1892 to 1897; and commanded one of Buller's divisions in the unsuccessful attempt at the beginning of the South African war to relieve Kimberley. At Magersfontein he was terribly beaten. With Lord Roberts he marched on Pretoria in 1901, May. In 1902, Mar., he was captured between Vryburg and Lichtenburg, but immediately released. His South African record formed a strange contrast to his early military career.

METHUEN: Mass., town, in Essex county; on the Spicket river, and on the Boston & Maine railroad; about two miles north of Lawrence. It was settled in 1641, but was a part of Haverhill until 1725, when it became the town of Methuen. The government is administered, as in its early days, by town meetings. It has a number of manufacturing establishments, chief of which are cotton and woolen factories, bell foundry, organ factory, knitting mills, hat factory, worsted goods and yarn factories, and basket factories. It has good schools and the Nevins Memorial Library. Pop. (1900) 7,512.

METHUEN TREATY: a commercial treaty between Great Britain and Portugal, signed in 1703 and annulled in 1835, having to do with the tariff on wines and wool. It was negotiated by Paul Methuen, the British ambassador to Portugal.

METHUSELAH, *mĕ-thū'sĕ-la* ('man with a dart?'): Hebrew patriarch. He is remarkable as the oldest man mentioned in the Bible, his age being stated in Gen. v. 27 as 969 years. According to Hebrew chronology, and to that of the Samaritan version (which, however, reduces his age to 720 years), he died in the year of the flood; but the Septuagint calculation makes him die six years earlier.

METHYL, n. *mĕth'ĭl* [Gr. *methu*, wine; *hulē*, material]: the hydrocarbon radical of methylic alcohol, being a colorless inflammable gas burning with a luminous flame. METHYLAMINE, n. *mĕ-thĭl'a-mĭn*, ammonia in which one atom of hydrogen is replaced by methyl (see METHYL, below). METHYLATED, a. *mĕth'ĭ-lāt-ĕd*, containing methyl. METHYLIC, a. *mĕ-thĭl'ĭk*, of or pertaining to methyl.

METHYL: hypothetical monovalent radicle (q.v.), CH_3. Some of the more important compounds in which

it occurs are methyl alcohol, CH_3OH; methylamine, CH_3NH_2; methyl chloride, CH_3Cl; methyl bromide, CH_3Br; methyl iodide, CH_3I; methyl ether, $(CH_3)_2O$; methyl benzene (toluene), $C_6H_5CH_3$; methyl sulphate, $(CH_3)_2SO_4$, and methane (methyl hydride), $CH_3H(CH_4)$. For further details vide the compounds cited.

METHYL ALCOHOL: sometimes called 'wood alcohol' or 'wood spirit,' H_3COH, can be prepared artificially, by synthesis, in a number of ways, but is usually manufactured by distilling wood. In combination with salicylic acid it forms the characteristic constituent of wintergreen oil. Methyl alcohol is a mobile liquid, with a spirituous odor and a burning taste. It boils at 66°—67° C.; at 20° its density = 0.796, and it mixes with water, ether, or alcohol in any proportion. The importance of methyl alcohol is not confined to its use in the laboratory as a solvent and for the preparation of more complex compounds; it is employed for similar purposes on a manufacturing scale, particularly in the making of dyes. Methyl alcohol is also used largely as a fuel and as a solvent in the production of varnishes. From the theoretical standpoint it is of great interest because it is the simplest alcohol.

METHYLAMINE: the simplest organic anologue of ammonia; has the formula H_2NCH_3. It occurs in *Mercurialis perennis* and *annua*, in bone-oil, and in the distillate from wood, and it may be synthesized in a variety of ways. Methylamine is a colorless gas, with an odor of ammonia. It boils at -6° C., and, unlike ammonia, will burn in air. Water, at 12° C., dissolves 1,150 volumes of the gas; the resulting solution exhibits all the general properties of ammonia water. Methylamine is largely used in the preparation of more complex organic compounds.

METH'YLATED SPIRIT: the common English name of a mixture of ordinary (ethyl) alcohol, with 10 per cent. of wood alcohol (impure methyl alcohol) and a small quantity of mineral naphtha. These materials are added to the ethyl alcohol in order to render it unfit for drinking. Methylated spirit is allowed to be sold duty free. For purposes of combustion it is as good as ordinary alcohol, but it is inferior to it for use as a solvent, except for such purposes as the manufacture of varnish or of transparent soap, or in the preparation of collodion; it cannot take the place of alcohol in the preparation of the finer chemicals.

METHYL BENZENE: the chemical name of toluene (q.v.).

METHYL BROMIDE: a colorless liquid, prepared by the action of phosphorus and bromine on methyl alcohol. It boils at 4.5° C., has sp. gr. 1.73 at 0° C., and is used for synthetical purposes in organic chemistry. Its formula is CH_3Br, and it is sometimes termed brommethane.

METHYL CHLORIDE: sometimes called chlormethane, CH_3Cl; is a colorless gas, with a sweet odor. It is prepared by heating a mixture of methyl alcohol (wood spirit) with sodium chloride and sulphuric acid. Methyl chloride is used in the manufacture of dyes and other chemicals and also for producing low temperatures. It boils at -24° C. Alcohol and water dissolve 35 and 4 volumes of methyl chloride respectively.

METH'YLENE: hypothetical bivalent radicle, $>CH_2$. It occurs in numerous organic compounds, such as formaldehyde, H_2CO; methylene chloride, H_2CCl_2; malonic acid, $H_2C(COOH)_2$, etc.

METHYL HYDROGEN SULPHATE: also called methyl acid sulphate, and, less correctly, methyl sulphuric acid, $O_2S<^{OCH_3}_{OH}$; is prepared by mixing methyl alcohol with concentrated sulphuric acid. It is a thick liquid, which cannot be distilled. It is an intermediate product in the formation of dimethyl ether, $(CH_3)_2O$, from methyl alcohol, and its chief importance is its relationship to those two compounds. Its isolation from the products of the reaction in question threw much light on the processes leading to the conversion of an alcohol into an ether, and this knowledge played a very important part in the development of organic chemistry.

METHYL HYDROGEN SULPHIDE: also called methyl mercaptan, or, more rarely and less correctly, methyl sulphhydrate; has the formula $HSCH_3$. It is the simplest thioalcohol, and bears the same relation to hydrogen sulphide, H_2S, that methyl alcohol, $HOCH_3$, bears to water, H_2O. Methyl hydrogen sulphide is prepared in a variety of ways, which are applicable to the production of other members of this series of compounds. The simplest plan is to treat potassium hydrogen sulphide, KSH, with methyl chloride, bromide or iodide (q.v.). Like the other thioalcohols, methyl hydrogen sulphide is a colorless liquid, with an extremely disagreeable odor resembling that of garlic; it boils at 6° C. In general, methyl hydrogen sulphide has properties similar to those of the alcohols (q.v.), but it forms crystalline compounds with a number of metals; of these the mercuric compound, $(H_3CS)_2Hg$, is the best known and will serve as an example. The alcohols only form such metallic derivations with the alkali metals. Methyl hydrogen sulphide is the starting point in the preparation of a considerable number of more complex organic compounds containing sulphur.

METHYL IODIDE: also called iodomethane, CH_3I; is a heavy, sweet smelling liquid, prepared by the action of phosphorus and iodine on methyl alcohol (wood spirit). It boils at 43° C., has sp. gr. 2.19 at 0° C., and is used for synthetic purposes in organic chemistry.

METHYL SULPHATE: a colorless, heavy liquid, prepared most simply by the action of methyl iodide (q.v.) on silver sulphate, Ag_2SO_4. Methyl sulphate has an odor of peppermint and boils at 188° C. Its formula is $O_2S(OCH_3)_2$, and it is largely employed for the introduction of the methyl group CH_3 into the molecules of organic compounds.

METHYL SULPHIDE: sometimes termed dimethyl sulphide or methyl thioether, $(CH_3)_2S$; is the sulphur analogue of dimethyl ether, $(CH_3)_2O$ (q.v.). It is prepared by the action of methyl iodide, CH_3I, on potassium sulphide, K_2S. Methyl sulphide is a colorless liquid, with a pleasant ethereal odor, but the smell of impure specimens is very unpleasant. It boils at 37.5° C.

METIC, n. *mĕt'ĭk* [Gr. *metoikos,* a settler, an alien—from *meta,* change; *oikos,* a house: L. *metœcus,* a stranger]: a sojourner; a resident stranger; an alien.

METIS, n. *mē'tĭs* [in *Gr.* and *L. myth., Mētis,* the daughter of *Ocĕănus*]: one of the asteroids or minor planets. See PLANETOIDS.

METOCHE, n. *mĕt'ō-kē* [Gr. *metoche,* I am a partaker of]: in *arch.,* the interval or space between two dentils.

METONIC, a. *mē-tŏn'ĭk* [from *Meton* (about B.C. 432), an Athenian, its discoverer]: epithet applied to the cycle of the moon. METONIC CYCLE or METONIC YEAR, a period of 19 years, at the end of which time the new moons fall on the same days of the year, and eclipses recur in nearly the same order. This arises from the fact that 19 solar years are nearly equal to 235 lunations, their average values being 6,939.68835 and 6,939.60249 days respectively.

METONYMY, n. *mĕt'ŏ-nĭm-ĭ* or *mĕt-ŏn'ĭ-mĭ* [L. *metonymĭă*—from Gr. *metōnum'ĭă,* a change of name—from *meta,* over, change; *onŏma,* a name: F. *métonymie*]: in *rhet.,* a figure of speech in which one word is substituted for another to which it has some relation—as a part for the whole, the effect for the cause, the abstract for the concrete—e.g., 'I have read Milton,' that is, his works; 'they have Moses and the prophets,' that is, their writings. This expressive figure is much used in proverbial and other pithy modes of speech. METONYMIC, a. *mĕt'ŏ-nĭm'ĭk,* or MET'ONYM'ICAL, a. *-ĭ-kăl,* used by way of metonymy; putting one word for another. MET'ONYM'ICALLY, ad. *-lĭ.*

METOPE, n. *mĕt'ō-pē* [Gr. *metŏpē*—from *meta,* with, between; *opē,* an opening]: in *arch.,* space, in the frieze of the Doric order, between the triglyphs—generally ornamented with figures, or bulls' heads, or pateræ.

METOPOSCOPY, n. *mĕt'ō-pŏs'kŏ-pĭ* [Gr. *metopon,* the forehead; *skopĕō,* I view]: the pretended art of discovering the character or disposition of individuals by the features or lines of the forehead.

METRA, *mĕt'ra:* ingenious pocket-instrument, invented about 1858; combining the thermometer, climometer, goniometer, anemometer, level, plummet, scales, etc., so that, by its assistance, travellers or engineers can determine the dip of rocks, angles of crystals, temperature, rate of wind; can take levels of large surfaces, determine latitude, and a variety of other matters connected with physical science; and can at once record their observations.

MÈTRE, n. *mā'tr,* or METER, n. *mē'tĕr* [F. *mètre*]: French unit of length. The mètre is the basis of the 'metric' or modern French system of weights and measures. See METRIC SYSTEM; DECIMAL SYSTEM.

METRIA, n. *mē'trĭ-ă* [Gr. *mētra,* the womb]: childbed or puerperal fever. METRIC, a. *mē'trĭk,* of or belonging to the womb. METRITIS, n. *mē-trī'tĭs,* inflammation of the womb. METRALGIA, n. *mē-trăl'jĭ-ă* [Gr. *algos,* pain, grief], or METRODYNIA, n. *mē'trō-dĭn'ĭ-ă* [Gr. *odŭnē,* pain]: pain in the womb. METROPHLEBITIS, n. *mē'trō-flē-bī'tĭs* [Gr. *phleps,* a vein; *phlebos,* of a vein]: inflammation of the veins of the womb.

METRIC, a. *mĕt'rĭk* [F. *mètre,* a measure]: denoting measurement. METRIC SYSTEM, system of weights and measures first adopted in France, the two most important points in which are—1, that it is a decimal system; 2, that the units of length, superficies, solidity, and weight are correlated, two data only being employed: the *metre,* and the weight of a cube of water whose side is the 100th part of a metre (q.v.).

METRIC SYSTEM, THE INTERNATIONAL: in early times each locality and industry had its own system of weights and measures, which crudely served local needs and primitive conditions. With increasing intercourse between communities, this diversity of units and standards proved confusing and intolerable, and the demand for a simple universal system grew steadily to a climax in the closing years of the 18th century. The metric system of weights and measures was the fruit of decades of research, agitation, and indefatigable labor toward this end.

As early as 1670, Abbé Gabriel Mouton proposed as the unit for length an arc of one minute of the earth's circumference. Decimal subdivisions and multiples of this unit and an excellent Latin terminology were also suggested. Fifty years later, J. Cassini again suggested this unit. Christopher Wren, the English architect of Saint Paul's, urged as a unit the length of a pendulum beating half seconds. The length of a seconds-beating pendulum was proposed successively by Picard (1671), Huygens (1673), La Condamine (1747), and by Prieur, Miller, Jefferson, and Talleyrand in 1790. About 1783, James Watt, the inventor of the steam-engine, proposed a new decimal system with a simple inter-relation be-

tween the units of length, area, volume, and weight, a definite volume of water being taken as the unit of mass. In 1782, Gouverneur Morris, of Philadelphia, urged the use of the decimal ratio in the new monetary system. This was adopted and undoubtedly impressed the French with the great convenience of using the same universal system in daily trade which is used to express all abstract values. Influenced by the report of Morris, Thomas Jefferson, then secretary of state, on May 20, 1790, published a report outlining a decimal system of weights and measures.

Before the French National Assembly took the action in 1790 which culminated in the establishment of the metric system, the important elements and principles of a universal system of weights and measures had already been formulated: (1) The Arabic numerals with their decimal notation, already in use throughout Europe long before Roman numerals were discarded in English accounting; (2) the decimal ratio, whose origin antedates history, applied by the United States to its coinage upon recommendation of Gouverneur Morris; (3) a natural base for the unit of length urged by Christopher Wren; (4) an aliquot part of the earth's circumference suggested by Mouton; (5) a precise and scientific terminology formulated by the same illustrious Abbé; (6) a direct and simple inter-relation between the units of dimension and mass urged by James Watt; and finally (7) international co-operation suggested by La Condamine about the middle of the 18th century.

In 1790, new systems of weights and measures were introduced independently in the house of commons of England by John Miller, in the house of representatives of the United States by Thomas Jefferson, and in the national assembly of France by Prieur and Talleyrand. The noteworthy project of Prieur du Vernois was presented to the French assembly 1790, Feb. 9. The following month Talleyrand published a proposition concerning weights and measures which was later presented to the assembly, referred to the committee on agriculture and commerce, and considered by the assembly May 8. A decree, sanctioned by Louis XVI. on Aug. 22, 1790, approved the establishment of a new system, invited other nations to join in fixing the unit, and referred the whole subject to the French Academy for action. Representatives of Spain, Italy, Denmark, Netherlands, Switzerland and France actually participated in the consideration of the project. The academy commission, consisting of Borda, Lagrange, Laplace, Monge, and Condorcet, made a full report 1791, Mar. 19, which resulted in the decree of 1791, Mar. 26, sanctioning the choice of the earth's quadrant as the basis of the new system, the use of the units of dimension and mass. An arc of 10° on the meridian of Paris was measured with the utmost precision to deduce the length of the metre. The survey was

successfully completed by Delambre and Mechain in spite of extreme technical and political obstacles. Meantime, Lavoisier and Haüy, assisted by LeFevre-Gineau and Fabbroni, determined with the utmost care the weight of a definite volume of water as a basis for the new unit of mass. The nomenclature of the new system, based upon a report by the academy, 1793, Jan. 19, was fixed by law, 1795, Apr. 7, after 18 months of discussion.

In 1799, an international commission composed of representatives of ten independent nations was convened in Paris to deduce and establish the precise length of the proposed metre. The adoption of the report of this commission by the legislature 1799, June 22, marked the real birth of the metric system. Platinum standards of the metre and kilogram were adopted and formally deposited in the Palais des Archives at Paris. Copies of the standards were deposited at the Conservatoire des Arts et Métiers, the Observatory of Paris, and others were presented to several countries, including the United States. Thus was established the metric system, which within a century became the legal system of more than two-thirds of the civilized world. Founded upon the simplest principles and the fundamental modes of thought, the system presented such admirable features that it rapidly grew in favor among the intelligent classes in all countries. By the close of the 19th century more than 40 countries had adopted the system, and in scientific work its use had become world-wide.

The metric system was from its inception distinctly an international system, but in order that it should attain its fullest success, it was imperative that provision be made for international standards and their proper preservation as well as for national standards and their regular re-comparison with the fundamental standards of the system. Inspired by the great increase of international intercourse, the growth of science and industry, and the growing demands for precision and uniformity everywhere, the emperor of France, Napoleon III., by decree of 1869, Sep. 1, called an international conference to arrange among other things for the construction of new metric standards to meet the most rigorous demands of modern metrology. Twenty-four nations appointed delegates and the first session opened at Paris 1870, Aug. 8. Five meetings were held and important preliminary work inaugurated, but the session was unfortunately cut short by the Franco-Prussian war. At the second session, which was convened 1872, Sep. 24, thirty nations were represented and remained in session until Oct. 12.

After careful consideration, the commission passed forty resolutions to govern the construction of the new standards; 21 of these propositions referred to the metre, 12 to the kilogram, and two refer to their preservation and the guarantee of their invariability. The necessary scientific investigations were made by eleven special com-

mittees of savants. It was decided that all the standards should be constructed of an alloy of 90 per cent. platinum with 10 per cent. iridium, and a tolerance of two per cent. in excess or deficiency (resolution No. 6). This refractory alloy possesses extreme hardness, a fine grain, and withstands chemical action to a remarkable degree. The iridium-platinum alloy was adopted upon the suggestion of Henri Sainte Claire-Deville, who with his brother Charles and the physicist Stas of Belgium devoted the ensuing 10 years to attaining the requisite purity of the constituent materials, in their investigations opening up new chapters in the chemistry of the refractory alloys. The first ingot, weighing 525 pounds, known as the 'alloy of 1874,' failed to meet the high standard of purity set by the commission. Several standards, however, were constructed, one of which is deposited at Washington. A new alloy was prepared in the most careful manner by Messrs. Johnson, Matthey & Company, of London, and after repeated meltings the required homogeneity was attained. The purity was tested by the chemists of the international committee and of the French section and was found to exceed the requirements in this respect. Thirty-one prototype metres were made from this casting, and the copy corresponding to the true length of the metre of the archives was selected as the international standard of length and is designated by the letter M. The international prototype metre is an irido-platinum bar 102 centimetres in length of a cross section, 20 millimetres square, intermediate between the capitals H and X, and of such form that the surface bearing the graduations lies in the neutral plane of the bar. The lines used to define the metre were traced at the Conservatoire des Arts et Métiers. There are three lines engraved near each end of the bar. They are 6 to 8 microns wide and about a half millimetre apart, and the metre is defined as the distance between the middle lines of each group when the temperature of the bar is at 0° Centigrade. Thirty-nine prototype kilograms were constructed, the one most nearly corresponding to the kilogram of the archives being selected as the international standard of mass and designated by the letter K. On Sep. 26, 1889, the international prototypes were unanimously approved, adopted, and formally deposited in a special vault at the International Bureau of Weights and Measures, fastened by three locks, the keys of which were delivered, respectively, to the custodian of the archives of France, the president of the international committee, and the director of the bureau. The vault in which the prototypes are preserved is opened not oftener than once a year, these three officers being present.

The national prototypes of the metre and kilogram, furnished to the states signatory of the convention of the metre, were of the same material, form, and perfect construction as the international standards themselves.

Each contributory country received two copies of each international standard, to be used as a working standard and a reference standard, respectively. The standards were accompanied by attested certificates of comparison, two hard glass thermometers, each with a table of corrections referring to the international hydrogen scale, a piece of the alloy cut from the end of the metre bar for testing the coefficient of expansion, and each kilogram was accompanied by a rock crystal bed plate and other accessories requisite to the safe conveyance of the standard. Metre prototypes numbered 21 and 27 were allotted to the United States, having corrections at 0° Centigrade of + 2.5 microns and —1.6 microns, respectively, the probable error of the determination, based upon 784 individual comparisons, being below 0.2 microns. The kilogram prototypes allotted to the United States are numbered 4 and 20, with corrections of —0.075 and —0.039 milligrams, and volumes of 46.418 and 46.402 millilitres, respectively. These copies display a noteworthy precision of adjustment. The probable error of the determinations, based upon 1,092 individual weighings, is less than 0.002 milligrams. The copies of the metric standards sent to the United States were received by the president at the executive mansion 1890, Jan. 2, the seals broken in his presence, and a certificate authenticating the standards was signed by President Harrison. The standards were at once deposited in the office of standard weights and measures and are now in the custody of the United States bureau of standards, which was established 1901, July 1, by act of 1901, Mar. 3.

The International Bureau of Weights and Measures was established by the metric convention of 1875, May 20, signed at Paris by the plenipotentiaries of most of the civilized nations of the world, the United States being the first to sign. This bureau has the custody of the international standards of the metric system, to which all prototypes of the world are referred for verification, in terms of which the units of all systems are now stated. The bureau is maintained jointly by the contracting states. The international bureau is located at Sevres, a suburb of Paris, on neutral territory ceded by France for this purpose. The work of the bureau is supervised by an international committee of weights and measures, which is itself under the control of a general conference for weights and measures, composed of delegates of all the contracting governments. This conference meets at least once every six years to discuss and initiate measures necessary for the dissemination and improvement of the metric system, and to pass upon new fundamental metrological determinations.

THE METRIC SYSTEM.

The fundamental unit of the metric system is the 'METRE,' which is the unit of length. From this unit the units of mass (gram), and capacity (litre), were derived.

METRIC SYSTEM.

All other units are the decimal subdivisions or multiples of these. Furthermore these three units are simply related so that for practical purposes one cubic decimetre of water weighs one kilogram and contains one litre. The metric terms are formed by combining the words 'metre,' 'gram,' and 'litre' with the six numerical prefixes.

PREFIXES	MEANING		UNITS
milli-	= one thousandth	or .001	
centi-	= one hundredth	or .01	'metre' for length.
deci-	= one tenth	or .1	
unit	= one	1.	'gram' for weight.
deka-	= ten	10.	
hecto-	= one hundred	100.	'litre' for capacity.
kilo-	= one thousand	1000.	

The following tables are formed by inserting successively the names of the three units in the column headed 'unit' in the above outline table:

LENGTHS.

Ten milli-metres	=	One centi-metre.
" centi-metres	=	" deci-metre.
" deci-metres	=	" metre (about 40 inches).
" metres	=	" deka-metre.
" deka-metres	=	" hecto-metre.
" hecto-metres	=	" kilo-metre (about 5/8 mile).

The square and cubic units are the squares and cubes of the linear units.

WEIGHTS.

Ten milli-grams	=	One centi-gram.
" centi-grams	=	" deci-gram.
" deci-grams	=	" gram (about 15 grains).
" grams	=	" deka-gram.
" deka-grams	=	" hecto-gram.
" hecto-grams	=	" kilo-gram (about 2 pounds).

VOLUMES.

Ten milli-litres	=	One centi-litre.
" centi-litres	=	" deci-litre.
" deci-litres	=	" litre (about 1 quart).
" litres	=	" deka-litre.
" deka-litres	=	" hecto-litre (about a barrel).
" hecto-litres	=	" kilo-litre.

The ordinary unit of land area is the HECTARE (100 metres square), and is equal to 100 Ares. The hectare is about 2½ acres.

The metric ton is 1,000 kilograms.

EQUIVALENTS (NEARLY ACCURATE).

LENGTH.

	Inches.	Feet.	Yards.	Fath's.	Miles.
Milli-metre ...	0.03937	0.003	0.001	0.000	0.000
Centi-metre ...	0.39371	0.032	0.010	0.005	0.000
Deci-metre ...	3.93708	0.328	0.109	0.054	0.000
Metre	39.37079	3.280	1.093	0.546	0.000
Kilo-metre	39370.79000	3280.899	1093.633	546.816	0.621

CAPACITY.

	Cubic In.	Cu. Ft.	Dry Pts.	Gals.	Bus.
Milli-litre	0.06103	0.000	0.0018	0.000	0.000
Centi-litre	0.61027	0.000	0.0182	0.002	0.000
Deci-litre	6.10271	0.003	0.1816	0.022	0.003
Litre	61.02705	0.035	1.8162	0.227	0.028
Hecto-litre	6102.70515	3.531	181.6211	22.703	2.838

WEIGHT.

	Grains.	Troy Oz.	Avoir. Pound.
Gram	15.43235	0.032	0.002
Kilo-gram	15432.34880	32.150	2.204

SQUARE MEASURE.

	Square Feet.	Square Yards.	Acres.
Centiare	10.764299	1.196	0.000
Are	1076.429934	119.603	0.025
Hectare	107642.993419	11960.332	2.471

The United States has already adopted the metric system for many purposes. In 1866, congress legalized it for all purposes (Revised Statutes, sec. 3569); all the states have been provided with copies of the metric standards (joint resolution of congress, approved 1866, July 28); foreign postal rates are fixed in metric units (Revised Statutes, sec. 3880); the subsidiary silver coinage is based on specified metric weights (Revised Statutes, sec. 3513); and in 1894, Aug., congress adopted the international electrical units based on the metric system as 'the legal units of electrical measures in the United States' (Revised Statutes, Sup. Vol. II., ch. 131). By proclamation of 1899, the metric system was made obligatory in Porto Rico, and by act of 1901 was made the legal system of weights and measures in the Philippines. The most important actions, however, were the establishment in 1875 of the International Bureau of Weights and Measures by the United States and other leading countries of the world (United States Statutes at Large, Vol. XX., page 107), and the adoption of the metre and kilogram as the fundamental standards of the United States, from which the yard and pound are to be derived, 1893, Apr. 5.

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METRIST, n. *mē'trĭst:* a writer or composer of verses; a versifier.

METROGRAPH, n. *mĕt'rō-grăf* [Gr. *metron*, a measure; *grapho*, I write]: an apparatus on a railway-engine which indicates at any moment the speed per mile at which the train is travelling, and the time of arrival and departure at each station.

METROLOGY, n. *mē-trŏl'ŏ-jĭ* [Gr. *metron*, a measure; *logos*, discourse]: the science of weights and measures, or a treatise on them.

METRONOME, n. *mĕt′-rō-nōm* [Gr. *metron*, a measure; *nomos*, a law; *nŏmē*, division, partition]: small machine that measures and beats musical time, indicating the correct time or speed at which a musical composition should be played. Its invention, which in its rudiments is traceable as early as 1696, has been falsely ascribed to Mälzel 1815, inventor of the automaton trumpeter: see AUTOMATON. Mälzel only modified it. The test of a correct M. is, that when set at 60 it shall beat seconds. METRONOMY, n. *mē-trŏn′ŏ-mĭ*, the measurement of time by an instrument.

METROPOLIS, n. *mĕ-trŏp′ō-lĭs* [Gr. *mētrŏpŏlis*, a parent state, a chief city—from *mētēr*, a mother; *polis*, a city]: mother city; the chief city or capital of a kingdom or state; among *naturalists*, the district of greatest number, either of typical or of specific forms of plants and animals that exist within definite geographical limits. METROPOLITAN, n. *mĕt′rō-pŏl′ĭ-tăn*, in *church law*, the bishop of a *metropolis*, or 'mother city,' with its church, from which other churches have branched off, and on which other episcopal cities are in some sense dependent. The title did not come into use before the 4th c.; but the office or function can be traced to an earlier date. The Council of Nice, 325, recognized it as ancient. It is conjectured with some probability that the function, at least in its rudiments, was in existence at the middle of the 2d c. The attempt to trace it to the New Testament has not succeeded: it has discovered only that the apostles, gathering their early churches of converts, labored especially in great centres of population and influence, and were careful there to ordain 'elders' or 'bishops' (i.e., pastors). The natural inference that such pastors in such centres would be accepted as leaders by the surrounding and often daughter churches, and that their eminence would speedily lead to the conferring on them of functions essentially archiepiscopal and metropolitan, gives no basis for the supposition that the 'apostolic legates' Timothy and Titus were in any proper sense 'metropolitan archbishops,' with their suffragan bishops and provincial synods. (See Barrow, *Treatise on the Pope's Supremacy*, Suppos. v.) The jurisdiction of metropolitans, according to the ancient law of the church, was very considerable, and extended over all the bishops of that province of which the metropolitan see was capital. It was their privilege not only to summon and preside over provincial councils, to consecrate the provincial bishops, but also to decide certain causes, and in other ways to exercise authority within the sees of their suffragans. Recent canons have very much restricted their powers. The metropolitan is an archbishop, but distinguished from an ordinary archbishop by his having suffragan bishops subject to him, which is not necessarily the case of an archbishop.—In the Church of England, the Abps. of Canterbury and York are metropolitans, and in the Prot. Episc. Church of Ireland, those of Armagh and Dublin. In the newly constituted

hierarchy of the Rom. Cath. Church in England, the Abp. of Westminster has the rank of metropolitan. In the Rom. Cath. Church of Ireland, the Abps. of Armagh, Dublin, Cashel, and Tuam all possess the same rank. METROPOLITAN, a. having the rank of a metropolis, or pertaining to it; pertaining to the mother church. ME'-TROPOLIT'ANATE, n. *-lĭt'ā-nāt*, the office or see of a metropolitan bishop. METROPOLITE, n. *mĕ-trŏp'ō-līt*, archbishop; bishop of the mother church. MET'ROPOLIT'I-CAL, a. *-lĭt'ĭ-kăl*, chief or principal as applied to cities; denoting archiepiscopal dignity or power.

METROP'OLIS LOCAL MANAGEMENT ACT: one of the special acts of the British parliament, regulating the metropolis of the United Kingdom for ædile and sanitary purposes; passed 1855. It created the Metropolitan Board of Works, with extensive powers of drainage, sewerage, lighting, cleaning, removing nuisances, and general improvements, and with powers also to rate the occupiers of houses for expenses of general management. Formerly, each vestry had done what it thought proper within its own parish.

METROPOLITAN MUSEUM OF ART: a museum in Central Park, New York, near Fifth Ave. and opposite 83d St. It is the outcome of a public meeting in the Academy of Music, 1869, when a committee was appointed to draft a plan for founding an institution for the culture of art. The state legislature granted this committee a charter 'for the purpose of establishing a museum and library of art; of encouraging and developing the study of the fine arts; of the application of art to manufactures and to practical life; of advancing the general knowledge of kindred subjects; and, to that end, of furnishing popular instruction and recreation.' The contribution of $1,000 to the funds of the museum confers the title of patron; of $500, that of fellow in perpetuity; and of $200, that of fellow for life. Contributions of works of art or of books to the value of twice this amount may be accepted in lieu of money. The first important acquisition was what is known as the Blodgett collection of pictures, consisting chiefly of examples of Flemish and Dutch masters. An archæological collection, consisting of more than 30,000 objects, gathered by Gen. di Cesnola, U. S. consul to Cyprus, during his explorations among the ruins of that island, was next added. These collections were temporarily housed and exhibited until the legislature authorized the Park dept. to erect a permanent building, which was formally opened by the President of the United States 1880. Among the objects of interest are Egyptian antiquities and ancient sculpture; sarcophagi and mummies; terra-cottas, inscriptions, and bronzes; glass, laces, and ancient pottery; mediæval ivories and casts of sculpture. The collection of paintings is large and extremely valuable. Miss Catharine Lorillard Wolfe bequeathed paintings valued at over $500,000. The *Friedland, 1807*, by Meissonier, representing Napoleon saluting his troops as they go into battle, cost $69,000 and Rosa Bonheur's *Horse Fair* cost $55,500.

Many masterpieces of the world are here preserved, among them the *Return of the Holy Family from Egypt*, by Rubens, and *Lions Chasing Deer*, by the same. Among recent contributions are a number of architectural models, the Parthenon, Notre Dame, etc., and several hundred mummy-wrappings of rare colors. The Di Cesnola collection comprises nearly 4,000 pieces of terra-cotta, consisting largely of vases; the glassware, about 1,700 pieces, is of both Phœnician and Greek workmanship; the gold and silver ornaments were found at Curium, besides many in Greek tombs. A notable feature of the museum is a memorial to Edgar Allan Poe, presented by the actors of New York. It consists of a statue of Poetry crowning with immortelles a bronze bust. The public are admitted to the museum free of charge during 4 days of the week—Wednesdays, Thursdays, Fridays, and Saturdays, also on holidays. On other days an admission fee of 25 cents is charged. Electric lights have been arranged so that the paintings, etc., can be viewed at night, and on Tuesday and Saturday evenings the building is open until 10 o'clock. Since 1891 the doors have been opened to the public on Sunday afternoons, also.

METSU, *mĕt'sü*, or METZU, *mĕt'zü*, GABRIEL: Dutch painter whose pictures are rare and valuable, and of whose life but little is known: b. Leyden (prob.) 1630; died after 1667. It is supposed that he was instructed by his father, who was an artist, and by Gerard Dow, and that about 1650 he removed to Amsterdam and became a pupil of Rembrandt. He attempted sacred subjects first, but later turned with great success to depicting scenes in the market and tavern, and the social life of the upper classes. Among the most famous of his pictures are the *Game-Dealer's Shop*, at Dresden; the *Ride of the Prince of Orange*, purchased by Baron Rothschild 1873 for £3,000; and the *Market-place of Amsterdam*, at the Louvre.

METTERNICH, *mĕt'tĕr-nĭch*, CLEMENS WENZESLAUS NEPOMUK LOTHAR, Prince von Metternich and Duke of Pontella: eminent Austrian diplomatist and statesman: 1773, May 15—1859, June 11; b. Coblenz; son of FRANZ GEORG KARL, Count von M., Austrian diplomatist, associate of Kaunitz. M. represented a very ancient and distinguished family, whose original seat was in Jülich. Young M. was educated at the Univ. of Strasburg, and afterward studied law at Mainz and travelled in England. In 1795 he married the grand-daughter and heiress of the celebrated minister Kaunitz, by whom he acquired large estates. His diplomatic career commenced at the congress of Rastadt, which he attended as representative of the Westphalian counts. His rise was very rapid; he added to the advantages of his birth and connections a more than ordinary diplomatic ability, with most graceful and winning manners. In 1801 he became Austrian ambassador at Dresden: and on the outbreak of the third coalition war, he negotiated the treaty of alliance between Austria, Prussia, and Russia. In 1806

he went as ambassador to Paris, and concluded 1807 the treaty of Fontainebleau, very favorable to the interests of Austria; but on the outbreak of the war between France and Austria 1809, he was detained some time ere he could obtain his passport. In that year he succeeded Count von Stadion as minister of foreign affairs (beginning his course as first minister of Austria 1809–48). concluded the treaty of peace with the French minister Champagny, and accompanied Empress Maria Louisa to Paris. He guided the course of Austria amid the difficulties of 1812–3. He maintained at first a temporizing policy and a scheme of an armed mediation of Austria; but the obstinacy of Napoleon reduced him to the necessity of adopting at last a decided step, and led him to resolve on a declaration of war by Austria against France, 1813, Aug.; and he subsequently conducted with great ability the negotiations which ended in the completion of the quadruple alliance. On the eve of the battle of Leipzig, the emperor of Austria bestowed on him the princely dignity. He was afterward employed in almost all the chief diplomatic affairs of that eventful time; and after the congress of Chatillon and negotiations with the Count d'Artois, he went to Paris, and signed the convention of Fontainebleau with Napoleon, went to England to negotiate concerning a new quadruple alliance, and attended the congress of Vienna, of which he was unanimously elected president. He signed, as Austrian plenipotentiary, the second peace of Paris, 1815, Nov. 20. After this, he continued still to conduct the diplomacy of Austria, and 1821 was appointed chancellor (*Haus-, Hof- und Staatskanzler*), and 1826 succeeded Count Zichy in the presidency of ministerial conferences on home affairs. His efforts were now earnestly directed to the maintenance of peace in Europe, and preservation of the existing state of things in the Austrian dominions by the strictest measures of police and severe despotism. The revolutionary movement of 1848 breaking forth with sudden violence, caused the aged minister to flee from Austria, and to seek refuge in England; nor did he return to Vienna till the end of 1851, when he received great marks of honor and favor from the emperor; but though sometimes consulted, he was never again asked to undertake the cares of office. He died at Vienna. During 1815–48, he was the leader of European conservatism, in which he showed the blindness of infatuation, indulging in puerile denunciations of reformers and liberals, opposing constitutional government, and procuring the establishment throughout Germany of a system of repression with which he thought to stifle discontent, but which instead forced it into more insidious and more violent activity. It has been said of him that he was political diplomatist and manager rather than statesman. It is pleasant to record that in private he was lovable, affectionate in his family, delightful in his friendships. The general opinion respecting M. has been well expressed by the (London) *Times*

newspaper: 'He was renowned rather than great, clever rather than wise, venerated more for his age than his power, admired, but not lamented.' The *Memoirs* of M., largely autobiographical, throw valuable light on his times. They appeared, edited by his son, 1879–82.

METTLE, n. *mĕt'l* [a metaphor taken from the *metal* of a blade, upon the temper of which its power depends]: natural ardor; spirit; sprightliness; courage; warmth of temperament; in *OE.*, substance. METTLED, a. *mĕt'ld*, high-spirited; ardent; brisk; full of fire. METTLESOME, a. *mĕt'l-sŭm*, high-spirited; brisk; full of mettle.

METTRAY, *mĕt-trā'* or *mā-trā'*, THE REFORMATORY OF: parent of all institutions intended to reform and restore to society, and not merely to punish, juvenile delinquents. Demetz, of the Parisian bar, struck with the evils and hardship attending the committal to prison of young, and, considering their training and habits, scarcely responsible criminals, there to languish hopelessly for a time, and then to emerge worse than when they entered, resolved, in conjunction with the Vicomte Bretignères de Courteilles, to found a school for reformation of this class of offenders. In 1839, accordingly, the Reformatory, or, as it is called, the *Colony of M.*, was established, about five m. from the city of Tours in France; and its operation gave proof that, by agricultural and other industry, and well-considered rules of organization and discipline, the neglected criminal may be trained to take his place honestly in society. The children, wholly orphans, foundlings, and delinquents, in 1872 numbered 792. From the foundation till that date, 4,287 had been received. The relapses into crime of those who had left the colony amounted to only about 4 per cent. The success is due not solely to the excellent training and close supervision at M. itself, but to the care taken to preserve the link between the authorities and those who have left the colony. A small payment is made by the state for children sent under judicial sentence; the large extra expenditure necessarily incurred being defrayed from charitable contributions from individuals constituting the 'Paternal Society of Mettray.'

METZ, *mĕts*, F. *mās:* strongest fortress of the German imperial territory of Alsace-Lorraine, cap. of the dist. of Lorraine; before 1871, the main bulwark of France on her n.e. frontier, and cap. of the dept. of Moselle. It is on the Moselle, at its confluence with the Seille. The strength of M. consists in its exterior defenses, of which the principal are 11 forts, partly strengthened and improved since the German occupation, partly entirely new. The city contains many important institutions, barracks, hospital, military schools, and arsenals. The cathedral, Gothic, begun 1014, finished 1546, is remarkable for boldness, lightness, and elegance, and has a beautiful spire of open-work, 373 ft. in height. The industry is active;

there is trade in wine, brandy, indigo, glass; and there are several cloth manufactories in the neighborhood.

M., known to the Romans as *Divodurum*, was afterward called Mettis (corrupted from Mediomatrici, name of the people); hence the present form. Under the Franks, M. was cap. of Austrasia (q.v.). At the division of Charlemagne's empire, M., with the rest of Lorraine (q.v.), fell to Germany, and was afterward made a free city of the Empire. In 1552 it was treacherously taken by the French; and though Charles V. besieged the place from 1552, Oct.—1553, Jan., they kept it till it was formally ceded to them 1648. 1870, Aug., Bazaine was compelled to retire before the German army into M., with his forces; and after an investment of 70 days, during which no attempt was made to take the city by force (not even a single shell having been fired into it), Europe and the world heard the startling news of the capitulation of M., by which 180,000 men and immense military stores fell into German hands 1870, Oct. 27. By the treaty of Frankfurt, M. was annexed to Germany as part of Lorraine. Pop. (1869) 48,325; (1875) decreased by emigration into France, 37,925; or with garrison 45,856; (1881) 43,275; (1890) with garrison 59,723. Of the total civil pop. about half are Germans; of the total civil and milit. 17,000 are Protestants, 1,600 Jews; (1900) 55,462.

MEUDON, *mĕh-dōng':* town of France, dept. of Seine-et-Oise, 5 m. w. of Paris, on the Versailles and Paris railway. The *château*, approached by a fine avenue of four rows of lime-trees, was built by the side of an older château, the work of Philibert Delorme, by the Grand Dauphin, son of Louis XIV., 1699. During the Revolution, it was converted into a factory for warlike engines, and surrounded with a permanent camp, to keep out spies. The château, as it exists at present, was fitted up for Marie Louise by Napoleon 1812. It has a fine terrace, gardens beautifully laid out, and commands a very fine prospect. The Forêt de Meudon is a favorite holiday resort of the Parisians. Near it has been erected an expiatory chapel, dedicated to Notre Dame des Flammes, marking the scene of a terrible railway accident 1842, May, in which more than 100 persons were burned alive. Whiting is manufactured, and there are numerous bleach-fields. Rabelais was curé of M. for a long time. The château was for many years a favorite summer residence of Prince Napoleon.—Pop. 9,800.

MEULEBEKE, *mö'leh-bā-kĕh:* town of Belgium, province of W. Flanders, 20 m. s.w. of Ghent, on the Mandel, a tributary of the Lys. Weaving is carried on, and there are several breweries. It is near a railway, which connects it with Bruges and other places. Pop. 8,300.

MEUM and TUUM, *mē'ŭm, tū'ŭm* [L. *meum*, my or mine; *tuum*, thy or thine]: what is mine, and what is another's. *Note.*—Not knowing the difference between *meum* and *tuum* is politely saying the individual is a thief.

MEUNG, *mŭng* (or MEHUN, *mā-ŭng′*), JEAN DE: about 1279–1320; b. Meun, France: poet. He gained wide reputation by his scholarship; lived many years at the court of Philippe le Bel; and though author of many poems and sarcastic works, is best known by his attempt to complete the *Roman de la Rose*, left unfinished by Guillaume de Lorris. He wrote more than one-half of the work as it now exists.

MEURSIUS, *mē-ėr′sĭ-ŭs*, JOHANNES: 1579–1639, Sep. 20; b. Loosduinen, Holland: historian. He received a univ. education; became an accomplished philologist by study and travel; held the chairs of history (1610) and Greek in Leyden Univ.; and, leaving Holland on account of political disturbances, accepted a chair in the Acad. of Soröe, Denmark, where he died. He was esteemed one of the most learned men of his time; and besides many critical monographs on Greek and Roman literature, was author of a history of Denmark in Latin, and of *Glossarium Græco-barbarum* (1614) and *Athenæ Batavæ* (1625).

MEURTHE, *mėrt:* formerly a dept. in n.e. France, immediately s. of the former dept. of Moselle. The area was about 2,254 sq. m.; pop. (1866) 428,387. Its surface is undulating and picturesque; while along the e. border are the Vosges Mountains, rising in one point to 1,148 ft. The chief rivers are the Moselle and its affluents, the Meurthe, the Madon, the Seille, etc. This dist. is remarkable for beauty of scenery, fertility of soil, and variety of productions. After the treaty of Frankfurt, by which part of M. was ceded to Germany, the rest of M., with the small part of the dept. of Moselle that remained to France, was formed into a new dept. under the name MEURTHE-ET-MOSELLE; 2,015 sq.m.; pop. (1901) 484,722. Arrondissements: Nancy, Lunéville, Toul (from M.), and Briey (from Moselle); cap. Nancy.

MEUSE, *mėz:* river in n. Europe, rising in the dept. of Haute-Marne, France, and flowing n. through the depts. of Vosges, Meuse, and Ardennes. It traverses the mountainous 'forest of Ardennes,' and enters Belgium at Namur, where it is joined by the Sambre from the w.; thence running n.e. past Liége, it receives the Ouerthe; forms part of the boundary between Belgium and Holland; passes Maestricht and Roermund, and is joined by the Roer. Below Gorkum it separates into two branches, each of which afterward also divides into two, the whole finally discharging through these channels into the North sea. Their delta, forming shoals and quicksands, is larger than that of any other river in Europe. It passes, besides the cities mentioned, Verdun, Sedan, Mézières, and Charlemont, in France; and Venloo, Dort, and Rotterdam, in Holland. It is about 580 m. long, and navigable about 45 m. from its mouth.

MEUSE, *mėz:* frontier dept. in n.e. France: 2,400 sq. m.; pop. (1901) 283,480. The surface is traversed s.e. to n. w. by two parallel ranges of hills, which from the

right and left bank of the river Meuse (see MAAS), and separate it from the basin of the Seine on the w., and from that of the Moselle on the e. The Meuse, the Ornain, and the Aire are the chief rivers. The soil is generally poor, except in the valleys of the principal rivers, which are remarkably fertile and well cultivated. The usual crops are raised. Twenty-two million gallons of wine (red and white) are made annually. The four arrondissements are Bar-le-Duc, Commercy, Montmédy, and Verdun; cap. Bar-le-Duc.

MEUSE, a. *mūz,* as in *Meuse* Lane: a Scotch spelling of MEWS, *which see under* MEW 2.

MEW, v. *mū* [F. *miauler;* Ger. *miauen,* to cry as a cat: an imitative word]: to cry as a cat: N. the cry of a cat. MEW'ING, imp. MEWED, pp. *mūd.* MEWL, v. *mūl,* to cry as a child from uneasiness; to squall. MEWL'ING, imp.: ADJ. crying or screaming as a child. MEWLED, pp. *mūld.* MEWL'ER, n. *-ĕr,* one that mewls.

MEW, v. *mū* [F. *muer,* to moult, to mew—from L. *mutārĕ,* to alter, to change: Low Ger. *muten,* to moult: Norw. *muta,* to lurk or seek covert, as a bird moulting (see MOULT)]: to shut up; to confine; to inclose; to shed the feathers; to moult: N. a cage for hawks; in *OE.,* an inclosure; any place of confinement. MEW'ING, imp.: N. act of moulting. MEWED, pp. *mūd.* MEWS, n. plu. *mūz,* the royal stables in London, so called from having been the place where the hawks were kept; any range of buildings occupied as stables.

MEW, n. *mū,* or SEA-MEW [AS. *mæw;* Dut. *meeuw,* a gull or sea-swallow: an imitative word]: English term for the common European gull (q.v.) and various small gulls.

MEXICAL, a. *mĕks'ĭ-kăl* [from *Mexico*]: denoting an ardent spirit or brandy distilled from agave-wine.

MEXICAN WAR, THE: the annexation of Texas in 1845 laid the foundation for the war with Mexico. Although Texas had been practically free for many years, and had been recognized by the United States, England, France, and other countries, yet Mexico still refused to acknowledge its independence. When, therefore, the United States proposed to admit Texas into the Union, Mexico gave warning that the annexation would be equivalent to a declaration of war, and 1845, Mar. 6, protested, and soon afterward withdrew her minister and severed diplomatic relations. Her acts, however, scarcely justified her threats, as at that time at least little or no preparation was made for war. It has, therefore, been claimed that had the American government used a conciliatory policy peace might have been preserved, and friendly relations re-established.

At the moment, however, the Mexican people and authorities were in a rather belligerent attitude, due in part to pride, and in part to an expectation that the

United States would soon be involved in a war with Great Britain over the Oregon boundary, in which case Mexico would have a powerful ally to aid her. Did President Polk at this point seek to strengthen this hope in the minds of the Mexicans, intending at the proper moment to make a compromise and peace with England, as was done, and thus leave Mexico at the mercy of the United States? Perhaps history can never answer the question, but events at least seemed to march in harmony with the thought. For Mexico soon found herself in the dilemma that she must either sell California to the United States, receiving in return a goodly sum of money to appease her pride, or engage in a war to sustain her honor and territorial integrity. Mexico bravely, but perhaps not wisely, chose the latter alternative, not fully realizing the inequality of the contestants, nor the depth of the humiliation to which she would be subjected. Doubtless President Polk preferred to acquire California without war; but its acquisition was to be the principal measure of his administration. Hence if war was the only means to secure it, war it must be; at least enough to get possession of the desired territory, then he would be glad to return to a peace policy.

Causes of the War.—The immediate occasion, however, of the war was the dispute in regard to the western boundary of Texas. Proclaiming her independence in 1836, Texas asserted that her western boundary was the Rio Grande to its source, thence due north to the 42d degree of north latitude. The following year the United States recognized her independence, and in 1845, Dec., by a joint resolution, admitted her into the Union as a state, providing that boundary disputes were to be settled by the United States. President Polk accepted the boundary line claimed by Texas, and 1846, Jan. 13, ordered Gen. Zachary Taylor to march to the eastern bank of the Rio Grande as the western boundary of the United States. Mexico insisted that the Nueces river—100 miles eastward—was the true western boundary of Texas, and therefore that General Taylor was now on Mexican soil. On Apr. 25, 1846, the first blood was shed in a conflict between a band of Mexican troops that had crossed to the eastern side of the Rio Grande and a company of American soldiers. The news of this action was immediately communicated by General Taylor to President Polk, who sent his now noted message to congress, asserting that war was begun by the act of Mexico on American soil. Congress accepted, after a stormy debate in the senate, the president's statement, and war was recognized as existing.

Other causes than the two already noted were also at work, and helped to make a decision in regard to the justness of the war still more difficult. Mexico for many years had been in a chronic state of revolution. The natural result followed. American citizens in Mexico

sustained property losses, and doubtless were frequently unjustly arrested and even imprisoned. Claims arising from these causes had been in part settled under a convention of 1840, but many of them were still pending. Some were just; more, either unjust or extravagant in amount. President Polk united these unsettled claims with the boundary question, and demanded that Mexico receive an envoy extraordinary with power to settle both —on its face an eminently fair proposition. On the other hand, Mexico professed to be ready to receive an ambassador to settle the boundary dispute, but declined to receive Mr. Slidell as our minister when commissioned to settle all disputes, insisting that the two questions were distinct in kind and origin and should not be united. President Polk in his message asserted that this action of Mexico was in violation of her promise to receive a minister, and hence justified his administration in its measures, and forced him to take possession of the disputed territory.

The need of more slave territory was perhaps another factor in causing the war. At least many from the South took an aggressive position on all questions in dispute between the two countries and thus made a peaceable settlement more difficult. Both the economic and the political reasons for more territory began to be felt by 1846—the one to have new soil over which to spread the land-exhausting system of slavery; and the other to have new territory out of which to carve new slave states, that the equilibrium between slave and free states might be maintained. Some other forces tending to arouse the war and aggressive spirit may be noted. The cry of 'manifest destiny' played a part. Many, especially in the West, felt that the Pacific Ocean was the natural western boundary of the United States. They also demanded the 'Golden Gate' that commerce might be opened up with the Orient. The two great parties—the Whigs and the Democrats—divided quite sharply on the question; in fact, so completely that the war became almost a party, instead of a national, war. The Democrats as a rule supported the administration and its claim that the war was just. The Whigs, on the contrary, asserted that it was a most unholy and unrighteous war, and characterized it as Polk's war. Lincoln, entering congress in 1847, became a severe critic of the policy pursued.

President Polk summarized his reasons for recommending that congress recognize war as existing as follows: 'The grievous wrongs perpetrated by Mexico upon our citizens throughout a long period of years remain unredressed; and solemn treaties . . . have been disregarded. . . . Our commerce with Mexico has been almost annihilated.' He then adds: 'As war exists, and . . . exists by the act of Mexico herself, we are called upon by every consideration of duty and patriotism to

vindicate with decision the honor, the rights, and the interests of our country.'

The Campaigns.—The war with Mexico was accepted as a fact by congress 1846, May 13. There were four principal fields of action in its prosecution. (1) Along the Rio Grande, under the command of Gen. Zachary Taylor; (2) in California, where Capt. John C. Frémont and Admiral Stockton were in command; (3) in New Mexico, with Gen. Stephen W. Kearney leading the American forces; and (4) from Vera Cruz to the City of Mexico, under the command of Gen. Winfield Scott, the commander-in-chief of the American armies. Everywhere success attended the American arms. Perhaps it was the first war in history, lasting two years, in which no defeat was sustained by one party, and no victory won by the other.

General Taylor defeated the Mexican troops at Palo Alto May 8; at Resaca de la Palma the following day and captured Matamoras on the 18th. He remained near that city for some weeks to recruit his army and prepare to advance into the interior. On Sep. 24 he entered Monterey, after a siege of four days, and a gallant resistance by the Mexicans. Taylor's most famous victory, however, was won 1847, Feb. 23, at Buena Vista. General Scott gave orders, which unfortunately fell into the hands of Santa Anna, the Mexican general, for General Taylor to send some nine regiments to aid Scott in his proposed attack on Vera Cruz. Santa Anna immediately marched his whole command against Taylor, expecting to crush him in this weakened condition. It was 20,000 men against about 5,000. But the skill of Taylor, the persistence of his army, the organization and equipment of the American troops, won a great victory. Taylor became the hero of the hour, and Buena Vista made him an irresistible presidential candidate.

Frémont's course in California has been a subject of keen controversy. As leader of an exploring expedition he was already in northern California, and early in 1846 was recalled to the Sacramento valley. California was the goal of the political policy of Polk's administration. The means to secure its acquisition were uncertain. It might be gained by war; or by filling the territory with American settlers who in course of time might bring it into the Union as Texas had already been annexed; or it might be effected by securing the good-will of the native Californians who were already jealous of Mexican rule. The latter policy seems to have been the one adopted by the administration. The American consul at Monterey, Mr. Larkin, was developing this policy with a good prospect of success, it is claimed, when Frémont appeared on the scene. He seems to have developed a fourth policy, namely, the establishment of an independent government under the control of the American settlers in the Sacramento valley. This movement resulted

in the 'Bear Flag Republic,' and virtual civil war between the native Californians and the American settlers. At this moment the Mexican war began and the 'Bear Flag' was replaced by the 'Stars and Stripes.' It has been claimed by some California historians that Frémont's course, had not the Mexican war come at the moment it did, might have lost California to the United States. The native Californians, alienated as they were by his course, might have put themselves under an English protectorate in revenge for the treatment accorded them. Be this as it may, by the end of the year all California was conquered and held by American troops, and Frémont was regarded as the hero who had won the 'Golden Gate' by his energy and decision. Santa Fé was captured by General Kearney, and New Mexico secured with almost no loss of life. By the end of the year, therefore, all the territory that the administration desired was in the possession of its armies, but Mexico was still unconquered.

Scott had been chafing in Washington during the summer and fall of 1846 while Taylor was winning his brilliant victories. He asked to go to the front to assume chief command, but the administration retained him at the capital under the plea of needing his advice. As it happened this Democratic war was officered by Whig generals. Scott had already been a Whig candidate for President. The charge was now made that Scott was kept from command for fear that success might make him a more formidable candidate in 1848. Finally, when he was sent to the front in 1847, Jan., the cry was raised that the purpose was to dim the lustre of Taylor's victories, or at least to divide the popular support between the two generals in such a way as to destroy the political prospects of both.

General Scott invested Vera Cruz in 1847, Mar., and by the 27th had captured the fortress which had been thought to be almost impregnable, and was ready to enter the city. On Apr. 8 he started into the interior, and on the 18th captured Cerro Gordo; the 19th, Jalapa, and the 22d Perota. On May 15 he entered the important city of Puebla. Remaining here for some weeks he again advanced, in August, toward the capital, and on the 10th came in sight of the city of the Montezumas. Two important victories were won Aug. 20—at Contreras and at Churubusco. He captured Molina del Rey Sep. 8, and five days later the victory of Chapultepec gave him the City of Mexico itself, which he entered on the following day with an army of only 6,000 men. The war was practically over, but the victory was so complete that it began to be a question whether there was any government left with sufficient power to negotiate a treaty of peace. An agitation began with friends both in and out of congress, as well as in the cabinet, looking to the annexation of the whole of Mexico. Calhoun on the one hand, Webster and a majority of the Whigs on the other, joined hands to

GENERAL SCOTT ENTERING THE CITY OF MEXICO.

defeat this plan. President Polk was finally forced to make the ultimate decision. N. P. Triest was sent in 1847, Mar., to Mexico to make a treaty of peace. Failing he was ordered in the fall to return to Washington; but disobeying instructions he remained in Mexico, and on Feb. 2, 1848, concluded a treaty of peace in harmony with his original instructions. The administration was in a quandary. To ratify meant to condone the disobedience of Triest. To reject meant a prolongation of the war, and time to perfect the intrigue for the annexation of 'All Mexico.' President Polk, after some hesitation, decided to send the treaty to the senate for its consideration. Received Feb. 23, it was ratified, after some amendments, Mar. 10, by a vote of 38 to 14. On May 30 ratifications were exchanged and the war was at an end.

The Treaty of Peace.—The treaty of Guadaloupe Hidalgo (q.v.) gave to the administration of President Polk the territory that his diary informs us he intended to acquire, California and New Mexico. Mexico in return for the loss of its fairest northern provinces was paid $15,000,000, and released from all claims of all kinds held by citizens of the United States against her, estimated at $3,250,000, which the United States assumed. Boundary lines were drawn, and provision made in regard to other questions at issue between the two countries.

Results.—Usually successfully waged wars redound to the credit of the party in power. In this case, however, the Democratic party, the author and supporter of the war, was defeated by the Whig party, the party of opposition and criticism, in the presidential election of 1848. The Whigs made use of the popularity of a successful general to defeat the party that had made his glory possible. Evidently the American people were ready to accept the fruits of the war, but also ready to punish the party that they believed had wrought in a wrong manner. Again, a large number of young officers destined to renown in later years proved their worth in this war. U. S. Grant and Wm. T. Sherman on the one side; Robt. E. Lee, 'Stonewall' Jackson and Jefferson Davis on the other, in the great Civil war, foreshadowed, in this Mexican struggle, the greatness that was to be theirs in the 'days that tried men's souls' from 1861 to 1865. The acquisition of 522,568 square miles of territory—an empire four times as large as Great Britain, in itself—was the most important immediate as well as remote result. It was important: first, in the issues that its acquisition precipitated. Should it be slave or free territory? Who should determine its institutions? And out of this question grew the larger one, who had the right to control the institutions of the territories in general? To settle the first question David Wilmot, a Democrat of Pennsylvania, proposed the celebrated 'Wilmot Proviso' (q.v.)

which would exclude slavery forever from all territory acquired from Mexico. Four long years of intense and bitter debate followed. This question and a series of others were settled temporarily in the Compromise of 1850. The second question was answered by the phrase 'Non-intervention,' which meant, or soon came to mean, one thing to Douglas and the Northern Democrats, and another to Davis and the South. Three main theories were evolved or defended in answer to the third query. (1) That congress had the right to control the institutions of the territories and could make them slave or free at its will. (2) The Dickinson-Cass-Douglas doctrine of Popular or 'Squatter' sovereignty—the doctrine that the people of a territory themselves, while yet in a territorial status, determined their own institutions. (3) The radical southern view that slaves were property, and, as property might be taken into any territory—the common public domain of the States—with no constitutional power anywhere to hinder or prevent. It was important secondly in its industrial and political effect on the nation. The United States now had an outlook on the Pacific ocean comparable to that on the Atlantic. China, Japan and the East were brought within the circle of its influence. Conditions favorable to further expansion were prepared. In addition to the great effect on commerce thus prefigured, that on wealth and industry was not less. The gold, silver, copper and other mineral wealth of the Rocky mountain region was turned into the pockets of the American people. This vast addition of territory and wealth tended also to emphasize national pride and ambition; to arouse a still more intense belief in 'manifest destiny'; to develop a more optimistic tone, and perhaps also to produce a more materialistic spirit.

Consult: Von Holst *Constitutional History of United States;* Burgess, *The Middle Period;* Benton, *Thirty Years' View; Lives and Times of the Tylers;* Grant, *Memoirs;* Lowell, *Biglow Papers;* Lincoln, *Works;* Corwin, *Speeches;* Richardson, *Messages; Congressional Globe* (1846-8); Schouler, *History of the United States;* and the separate histories of the war by Ripley (1849), Ladd (1883), and Wilcox (1892).

MEXICO, *mĕks'ĭ-kō*, Sp. *mā'hē-kō:* republic, occupying the southwestern extremity of North America, with a portion of the isthmus which connects North and South America. It is bounded n. by the United States, w. by the Pacific ocean, s. by the Pacific and Guatemala and Belize, e. by the Gulf of Mexico, Caribbean sea, Guatemala and Belize; area about 750,000 sq.m. Pop. (1881) about 10,000,000; in this total there were: full-blooded Indians, 5,000,000; Mestizos (half-castes), 3,000,000; Creole whites, 1,500,000; Spaniards, 50,000; other Europeans and Americans, 100,000; negroes, 10,000; besides mulattoes. Pop., census of 1900, 13,545,462.

MEXICO.
SCALE OF STATUTE MILES.
0 50 100 200 300 400
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R., McN. & CO. ENGR'S CHI.
UNITED STATES
MEXICO
GULF OF MEXICO
PACIFIC OCEAN
CHIHUAHUA
DURANGO
NUEVO LEON
TAMAULIPAS
CAMPECHY
CHIAPAS
YUCATAN
GUATEMALA
BRITISH HONDURAS
BRUZE
SALVADOR
TEHAUNTEPEC
TROPIC OF CANCER
GULF OF CALIFORNIA
LOWER CALIFORNIA
Mouths of the Mississippi
New Orleans
Galveston
Houston
Corpus Christi
Brownsville
Matamoras
Tampico
Pueblo Viejo
Tuxpam
Vera Cruz
Tehuantepec
Acapulco
Mazatlan
Guaymas
Cape S. Lazaro
Cape Corrientes
Cape Falso
Cape S. Lucas
Revillagigedo Islands
Socorro
Tres Marias
Tres Marias Islands
Pt. San Domingo
Pt. San Benito
Ft. Angel
Ft. Angel Gulf
Ahuachapan
San Salvador
San Miguel
Salama
Chahulmuntz
Ozuluama
Tuxtla
Tabasco
Tepic
Mexico
Puebla
Oaxaca
Guadalajara
Zacatecas
San Luis Potosi
Monterrey
Saltillo
Chihuahua
Durango
Mazatlan
Guaymas
Hermosillo
Tucson
Phoenix
Yuma
Ensenada
San Diego
Santa Ana
Sto. Thomas
San Felipe
San Quintin
San Fernando
Santa Ana
Bayo Sebastian
I. del Cedros
Pt. Eugenia
Maria
S. Ignacio
Pt. San Domingo
Cape S. Lazaro
I. Sta. Margarita
La Paz
Todos Santos
Cape Falso
Cape S. Lucas
San Jose del Cabo
Santiago
Mazatlan
Rosario
Rosa Morada
San Blas
Tepic
Cape Corrientes
Revillagigedo Islands
Socorro
Manzanillo
Colima
Zapotlan
Volcano de Colima
Morelia
Guadalajara
Aguas Calientes
Lagos
Silao
Guanajuato
Zacatecas
San Luis Potosi
Saltillo
Monterrey
Durango
Chihuahua
Ojo Caliente
Casas Grandes
Ciudad Juarez
El Paso
Tierra Blanca
Laguna
Presidio del Norte
Fort Stockton
Pecos
Ft. Sumner
Clovis
Springer
Tucumcari
Las Vegas
Santa Fe
Albuquerque
Silver City
Deming
Lordsburg
Tucson
Nogales
Guaymas
Hermosillo
Ortiz
Altar
Magdalena
Arizpe
Sonora
Urres
Ciudad Porfirio Diaz
Eagle Pass
Victoria
Corpus Christi
Laredo
Sabinas
Monclova
Parras
Saltillo
Torreon
Mapimi
El Oro
Allende
Jimenez
Sta. Rosalia
Concepcion
Santa Rita
Ramos
Sinaloa
Chino
Cosala
Culiacan
Altata
Papasquiaro
Durango
Nombre de Dios
Mapiuli
Bracamonte
Zacatecas
Guadalajara
Lagos
Silao
Guanajuato
Aguascalientes
San Luis Potosi
Linares
San Carlos
Ciudad Victoria
Guadalcazar
Rioverde
Ciudad del Maiz
Sotola Marina
Tampico
Pueblo Viejo
Tuxpam
Papantla
Jalapa
Vera Cruz
Orizaba
Alvarado
Tehuacan
Tlaxcala
Puebla
Tasco
Cuernavaca
Cuernavaca
Oaxaca
Tehuantepec
Salina Cruz
Tuxtla
Palenque
San Cristobal
Comitan
Tabasco
Frontera
Campeche
Champoton
Ozuluama
Tampico
Rio Verde
Tiaul
Belouchenitzes
Espita
Valladolid
Tizimin
Progreso
S. Tellpo
I. Holbox
Escalar
Valbas
Flores
Salama
Chahulmuntz
Ahuachapan
San Salvador
San Miguel
Ft. Angel
Ft. Angel Gulf
Pt. San Benito
Tehuantepec
Acapulco
Ometepec
Jamiltepec
Bucerias

States.	Sq. M.	Pop. 1900.	Capitals.	Pop. 1900.
Aguas Calientes	2,895	101,910	Aguas Calientes	35,042
Campeachy	25,832	84,281	Campeachy	.....
Chiapas	16,048	363,607	San Cristobal	.....
Chihuahua	79,021	327,004	Chihuahua	.....
Coahuila	50,890	280,899	Saltillo	23,996
Colima	3,743	65,020	Colima	.....
Durango	42,510	371,274	Durango	31,092
Guanajuato	11,411	1,065,317	Guanajuato	41,486
Guerrero	24,550	474,594	Chilpancingo	.....
Hidalgo	8,163	603,074	Pachuca	37,487
Jalisco	39,168	1,137,311	Guadalajara	101,208
Mexico	7,838	924,457	Toluca	25,904
Michoacan	25,689	935,849	Morelia	37,278
Morelos	1,776	161,697	Cuernavaca	.....
Nueva Leon	23,635	326,940	Monterey	62,226
Oajaca	33,591	947,910	Oajaca	35,049
Puebla	12,021	1,024,446	Puebla	93,521
Queretaro	3,207	228,489	Queretaro	33,152
San Luis Potosi	27,500	582,486	San Luis Potosi	61,019
Sinaloa	36,198	296,109	Culiacan	.....
Sonora	79,021	220,553	Hermosillo	.....
Tabasco	11,851	158,107	San Juan Bautista	.....
Tamaulipas	20,225	218,948	Ciudad Victoria	.....
Tlaxcala	1,620	172,217	Tlaxcala	.....
Vera Cruz	26,232	960,570	Jalapa	.....
Yucatan	29,567	312,264	Merida	34,630
Zacatecas	22,998	462,886	Zacatecas	32,856
Federal District	461	540,478	Mexico	344,721
Cal., Lower	61,562	47,082	La Paz	.....
Terr. of Tepic	11,580	149,677	Tepic	.....

Physical Character, etc.—The great mass of the Mexican territory consists of an elevated plateau, formed by an expansion of the Cordillera (q.v.) of Central America, from which terraced slopes descend with more or less rapid inclination toward the Gulf of Mexico on the e., and the Pacific on the w. This vast tract, 14°—33° n. lat., and 86°—118° w. long., comprises one of the richest and most varied areas in the world; for while its geographical position secures to it a tropical vegetation, the rapid differences of elevation afford it the advantages of temperate climates, in which all varieties of European flora and fauna can come to perfection; and it thus combines within its limits an almost unparalleled exuberance and multiplicity of natural products. The table-lands of Mexico are at elevations 5,000 to more than 9,000 ft. above sea-level, and exhibit great differences of level and varieties of soil. They generally incline northward and are girt in by low mountain chains, among which rise individual lofty peaks—e.g., Cofre de Perote (13,415 ft.), Orizaba (17,362 ft.); while they are intersected by higher ranges, above which tower a few cones—e.g., Ixtaccihuatl, the White Woman (16,076 ft.), and the volcano of Popocatapetl, or the Smoking Mountain (17,450 ft.). These figures are taken from Romero and are the best available. These volcanoes and several others of less note, form a transverse volcanic band between the two oceans, and do not follow the inclination of the central chain, as is the case in the volcanoes of South America. Volcanoes occur also isolated—e.g., in the plain of Mixtecapan, 2,900 ft. above the sea, where, 1759, the volcano Jorullo, which still emits smoke, was formed after an eruption by which a surface of many

sq.m. was raised several ft. above the level of the plain; in fact, every part of the Mexican territory betrays the volcanic nature of its formation. The principal chain intersecting the table-land is the Sierra Madre, in which lie the chief gold and silver mines, and which, after traversing the states of Queretaro and Guanajuato, divides into three main branches, the central of which forms the water-shed between the Pacific ocean and the Gulf of Mexico. In addition to these great chains, the Mexican territory is intersected by numerous minor ranges, which on the Pacific side break up the terraced declivities into innumerable deeply-cleft valleys, which assume almost the character of steep ravines near their junction with the narrow littoral plains of the Pacific ocean. Violent storms rage on this coast, blowing from the s.w. during the hot months, when the climate is as unhealthful to whites as on the Mexican Gulf, though it is rarely visited by the yellow fever. Mexico may be said to be generally deficient in navigable rivers; for though some of the largest have a course of more than 1,000 m., few are free from rapids. The Rio Santiago, or Rio Grande, with a course of 500 m., is broken near Guadalajara by 60 falls in less than three m.; the Rio Grande del Norte, which forms in its lower courses the boundary between Mexico and the United States, has a winding course of nearly 1,800 m., but is navigable only for small sailing-vessels to Matamoras, 60 m. from its mouth, where a bar and numerous shoals obstruct the passage. A similar remark applies to the majority of the rivers which fall into the Gulf of Mexico. The eastern coast generally presents great obstacles to navigation, as it is low and sandy, unbroken by bays or inlets, and lined by sand-banks several miles in width; the only points of access being the mouths of rivers, which are not good natural roadsteads, as, with few exceptions, the rivers have little water, except at the rainy season, which generally sets in about June, accompanied by overpowering heat, during the prevalence of which the yellow fever, or *vomito prieto*, rages like a pest in all these low lands. Important improvements have recently been made in the harbors of Tampico, Coatzacoalcos and Frontera. The best natural harbor, Vera Cruz, has also been the site of great works of improvement for some years past. Mexico is on the whole poorly supplied with water; and since the Mexicans have discontinued the system of irrigation followed through centuries with great success, many tracts have become barren, and unsuited for human occupation. A great portion of the table-lands can be used only for pasture. Springs are rare, and many of the rivers flow in deep mountain-beds, without receiving smaller tributaries, while the rapid evaporation on a light soil, covering porous rocks, leaves the surface dry and hot, and unable to support vegetation other than the cactus and some

low grasses. The plains, moreover, contain the beds of numerous dry salt lakes, but this is chiefly on the n. and e. of the table-land. The western parts of the plateaux 100°—102° w. long. yield, by careful irrigation, rich crops of maize and wheat, and rank among the most fertile agricultural districts of Mexico. They are, however, here and there interrupted by sterile tracts, covered by lava outflows and known as *pedregal* (stony land) or *malpais* (bad country). In contrast with these unprofitable districts, the plains are occasionally broken by depressions of the soil, known as *barrancas*, descending sometimes 1,000 ft., and measuring several miles across, covered with a luxuriant vegetation of trees and shrubs, and watered by small streams running through the middle of the valley. Mexico has numerous lakes, but few of importance; that of Chapala in Jalisco is one of the most considerable, being more than 80 m. long.

Climate, Products.—The differences of climate, depending on differences of altitude, are so great in Mexico that the vegetable products of this vast country range from those of the equator to those of polar regions. In a few hours, the traveller may experience every gradation of climate, and pass through different zones of vegetation, including wheat and the sugar-cane, the ash and the palm, apples, olives, and guavas. The Spaniards, on their first occupation of Mexico, distinguished its great climatic divisions under the characteristic names, which are still retained, of the *Tierra Caliente* (hot or littoral land), *Tierra Templada* (temperate land), and *Tierra Fria* (cold or high land). The mean annual heat of the Tierra Caliente is 77°; and the soil, generally fertile, produces maize, rice where water can be procured for irrigation, bananas, pine-apples, oranges, etc.; and sarsaparilla, jalap, and vanilla in the littoral swampy forests. This tract has only two seasons—the winter, or season of n. winds, and the summer, or season of breezes. In the winter, hurricanes are the terror of navigators, but the coast is clear of yellow fever, which prevails in the hot season. On the medium elevations of the Tierra Templada, the temperature is extremely equable, varying only from about 70° to 80° F.; the climate healthful, and wherever water is abundant, a perpetual summer reigns, yielding a varied and active vegetation, which embraces all the cereals, fruits, and vegetables of central and southern Europe, among which maize, oranges, lemons, grapes, and olives are in exuberant abundance. The Tierra Fria, which would scarcely have been characterized as cold by discoverers belonging to a less southern climate than Spain, possesses a generally temperate climate, the mean annual heat ranging between 66° and 68° F.; but on the highest of the table-lands the air is keener, and the soil more arid, and agriculture is limited to

the cultivation of barley and of the agave, or Mexican aloe, which is extensively cultivated for its juice, which is made into the fermented drink known under the name of *pulque*. In addition to the vegetable products above referred to, Mexico yields coffee, tobacco, yams, capsicums, pepper, allspice, indigo, ipecacuanha, dragon's blood, india rubber, mahogany, rosewood, ebony, etc.

The products of the mines, which rank among the richest in the world, include the precious metals. The early gold mines of Mexico were principally on the western side of the Sierra Madre, n. of 24° n. lat., and, until the discovery of the metal in Australia, their yield surpassed the product of any other part of the world. Silver mines abound in Mexico and the argentiferous veins, which may be said to intersect every part of the western declivities of the Cordillera, occur in some places—e.g., in the *Veta Madre* lode at Guanajuato—in beds 10 to 50 yards in depth; the precious metal being in these cases intermixed with sulphur compounds, antimony, and arsenic. But though these mines possess the additional special advantage of being in fertile districts, affording abundant food to miners and their cattle, their working has been very imperfect, owing to the unsettled state of the country. At the close of the 18th, and the beginning of the 19th c., the annual value of the gold and silver of Mexico was more than $30,000,000, of which nine-tenths were yielded by the silver; but the political disturbances, preceding and consequent on the wars of independence, very considerably reduced this sum. Recently interest in mining has greatly increased. The states of Sonora, Sinaloa, Durango, Guerrero, and Oaxaca have become active mining centres. In addition to gold and silver, Mexico yields tin, antimony, mercury, copper, lead, iron, and zinc; while carbonate of soda, used in smelting silver, is found crystallized on the surface of several lakes, and occurs, with common salt, in dry seasons, on the more arid parts of the surface of the elevated table-lands. The gold production in 1906-7 was valued at $36,563,898.24; that of silver at $77,088,827.

Cattle, horses, asses, mules, and sheep abound in Mexico, where, in consequence of the extent and excellence of the pasture grounds, all the domestic animals introduced from the old world have multiplied excessively. Among the wild animals are the tapir, wolf, puma or panther, jaguar, wild-cat, skunk, the brown porcupine, stag, deer, etc. Parrots, humming-birds, and game birds, including turkeys, are abundant; and almost all the lakes yield fish in abundance. The cochineal insect was formerly of commercial importance, and the silkworm is reared with great success, locally, on the table-land.

Agriculture.—This is backward in Mexico, from the ignorance and poverty of the peasants, and the scantiness of transportation and lack of improved machinery,

but the government labors assiduously to encourage it, by distributing pamphlets, seeds, plants, etc., especially vines, olive and fruit trees, cork oaks, flax and fodder plants, mulberry trees and silkworms; and by extending irrigation works. In 1900 299,280 sq.m., or two-fifths the entire surface, was uncultivated. This, of course, is largely made up of the vast sandy deserts of the north—the Bolson de Mapimí is a rocky wilderness of 50,000 sq.m., in Coahuila and adjoining states. Even so, much more is possible. The different climatic levels give a wonderful range of production, from the cereals and cattle of the northern regions, and the coffee of the temperate, to the cacao and sugar of the tropics. On the high lands are raised corn (over 100,000,000 bushels in 1900), barley, and wheat, the favorite Mexican *frijoles* or beans (12,314,400 bushels), large quantities of sweet and some common potatoes. On the plain of Apam grows the maguey (century plant), from which the celebrated Mexican *pulque* and its distilled product *mescal* are made, also yielding a fibre useful for soap, and razor strops. Coffee is cultivated widely, the centre of production being Vera Cruz, and the best brands esteemed equal to Mocha; the total crop in 1903 was valued at $11,440,515, of which Vera Cruz produced $7,825,387. Cacao, predominantly in Tabasco, total value $1,734,266; tobacco (do.), total value $4,541,581; vanilla, chiefly in Vera Cruz, value $758,633. Sugar cane (see *Manufactures*) yields 40 to 60 tons an acre. A coarse-stapled cotton is extensively grown in Durango and Coahuila, from 50,000,000 to 100,000,000 pounds annually. But next to corn, the most valuable production is that of fibre, from several varieties of agave. The chief is henequen or sisal hemp, valued for cables from its resistance to wet; product in 1903 valued at $41,087,852. Of ixtle or istle (*pita*, silk grass), for cordage, hammocks, bagging, etc., the product was valued at $2,953,213. The value of other large crops was as follows: Rice, $2,928,693; corn, $82,162,962; wheat, $19,235,784; sugar, $15,742,325; frijoles, $10,175,930; barley, $6,641,181; molasses, $6,477,374; pulque, $13,020,913. Rice and some indigo are also raised. The northern states are immense cattle ranges, and about 3,000,000 of beef cattle, sheep, swine, and goats are annually slaughtered, valued at about $46,000,000.

Manufactures.—President Diaz has endeavored to develop Mexican industries by high tariffs on all manufactured articles; but so far there is little beyond manufacture for local needs. The most important branch is that of goods from unbleached cotton or *manta*, which utilized in 1900 58,459,913 pounds of cotton, and in 1904 63,582,313 pounds. There are 119 cotton mills, employing 27,706 hands, and turning out over 12,500,000 pieces of cloth and 4,000,000 pounds of yarn, the latter much used in shawls and *rebozos* or scarfs. Next is the

woolen manufacture, largely a hand-loom business, but with two or three dozen mills; this is predominantly of the *zarape,* used by millions of Mexicans as a cloak by day and a blanket by night; but also of mixed cotton and wool blankets, knit underwear, carpets, and other articles. The silk industry is slight but growing, and there are a few paper mills. The third most considerable manufacture, however, is that of coarse pottery, carried on by local potters in every town, and in great variety of colors, glazes, etc. The sugar manufacture is growing; in 1905 it produced nearly 140,000 tons. The manufacture of aguardiente in 1904 was valued at $11,836,126; of sugar, $16,974,547; of molasses, $5,303,-032; of syrup, $3,335,317; and of pulque, $11,125,032. A large distillation of rum from molasses is carried on, as well as of *mescal* and *tequila* from pulque; there were over 2,000 distilleries. Nearly every town has a cigarette factory, and some have also cigar factories, and some 20,000,000 pounds of tobacco a year is thus employed, which does not supply the local demand. There is a small iron manufacture of household and agricultural implements; in Leon a considerable manufacture of hardware and cutlery; and in the City of Mexico is a government cannon foundry and arsenal. A little glass is made. Leather work is widely spread, centring in Leon; felt hats are made in the chief cities, straw hats in all; hammocks largely, especially in Yucatan; silver is wrought in all parts. There is a large, widely scattered manufacture of chocolate and confectionery; cottonseed-oil mills are numerous.

Commerce and Transportation.—Mexico has few good harbors on the Atlantic; but on the Pacific coast are the matchless ones of Guaymas, Acapulco, Manzanillo, and San Blas, and several others. The foreign commerce, chiefly with the United States and Europe, centres at Vera Cruz and Tampico on the Atlantic side. This amounted in 1906-7 to imports of $233,363,388.85, and exports of $248,018,010. From 1874 to 1904—a very brief period as time is computed in the making of a nation's history—the exports of merchandise by Mexico to the United States increased from $4,346,334 to $43,633,275, and the imports from the United States increased from $5,946,839 to $45,844,720. In the fiscal year 1905-6 the imports from all countries amounted to $220,651,074. Of this sum $16,386,828.71 consisted of animal substances; $32,616,928.93 of vegetable substances; $90,937,430.56 of mineral substances; $23,022,-528.30 of dry goods; $7,744,272.98 of chemical and pharmaceutical products; $7,246,351.07 of spiritous liquors and other beverages; $5,417,192.11 of paper and its applications; $20,539,212.70 of machinery and its parts; $4,620,031.53 of vehicles; $4,122,237.03 of arms and explosives, and $7,998,060.57 of miscellaneous articles. Increase over the previous year, $42,446,112.04. In the

same year the exportations totaled $271,138,809.32, the principal articles being: gold in various forms, $31,695,777.38; silver in various forms, $125,400,083.77; copper, $28,655,897.35; vegetable products, $62,928,135.51; animal products, $11,723,435.23; manufactured products, $2,978,441.02; miscellaneous, $799,621.57. Increase over the previous year, $62,618,357.89. Of the total importations, $145,600,313.49 were from the United States; $20,814,557.09 from Germany; $20,344,643.81 from Great Britain; $16,383,255.95 from France, and $7,595,531.31 from Spain, the remainder being divided among the other countries in amounts ranging from $1,000 to $2,500,000. In the same period the exportations totaled $271,138,809.32, as follows: gold in various forms, $31,695,777.38; silver in various forms, $125,400,083.77; copper, $28,655,897.35; lead, $4,967,806.23; other minerals, $1,989,621.26; coffee, $9,288,623.32; henequen, $29,437,318.50; hides, uncured, $7,882,867.25; vanilla, $4,157,394.99; textile, $3,667,844.88; beans, $3,791,212.97; cattle, $3,271,837.50; leaf tobacco, $2,216,282.06; chewing gum, $1,696,523.33; fresh fruits, $295,334.20; zacaton root, $1,872,757.00; woods, $1,881,961.67; sugar, $674,235.00; panama hats, $556,748.29; miscellaneous, $6,939,060.79. Of the total exportations, $166,010,052.43 were to the United States; $41,672,873.19 to Great Britain; $20,523,156.33 to Germany; $8,010,279.73 to France; $7,266,821.73 to Belgium; $2,201,295.00 to Spain, and $528,377.80 to Guatemala; no other country receiving $500,000. In the previous fiscal year the importations were $178,204,962.45, and the exportations, $130,303,978.09. Only as far back as the fiscal year 1894-5, the imports amounted to but $66,200,000 and the exports to $95,000,000, a remarkable record of material progress in the brief period of 11 years.

Further evidence of the wonderful commercial growth and importance of Mexico in recent years may be found in the statistics of the business done through her ports of entry. In 1904, the total number of steam vessels entering these ports was 4,744, having an aggregate carrying capacity of 4,984,437 tons, and the number of sailing vessels was 2,796, with a total carrying capacity of 367,131 tons. The actual amount of cargo discharged was 4,559,101 tons by both steam and sailing vessels. In the same year, 4,737 steam and 2,807 sailing vessels departed from the ports of the country, carrying a total cargo of 3,466,568 tons. From 1889 to 1904, inclusive, there was an increase of 2,324 in the number of vessels, both steam and sailing, which entered these ports. Of the entries in 1904, there were 5,946 from the ports of the republic, 822 from the United States, 351 from England, 122 from Cuba, 94 from Germany, 57 from Guatemala, 30 from France, 20 from Brazil, and 15 from Spain, while of the total sailings, 5,892 were to the ports of the republic, 916 to the United States, 305 to

England, 208 to Cuba, 67 to Germany, 54 to Guatemala, 20 to Spain, 15 to France, 15 to Italy, and 12 to Australia. The railway system dates only from 1873, when the first road—from the capital to Vera Cruz, 263 miles, with immensely steep gradients—was opened; but it has now over 12,250 m. of main track, well distributed across the country, extremely plentiful in the centre, and with long branches into the mining regions. The chief lines are the Mexican, Mexican Central, Mexican National, Great Eastern, International, Interoceanic, Mexican Northern, and Mexican Southern.

Government.—The country is a federal republic modeled on the United States, its states being internally supreme. The separation of executive, legislative, and judicial powers is maintained as with us. The constitution is of 1857, Feb. 5, but the amendments of 1873, Sep. 25 (under Lerdo, after Juarez' death) are of capital importance. These definitely separate church and state, forbid congress to establish or hamper any religion or establish monastic orders on any pretext, constitute marriage a civil contract, and substitute affirmation for religious oath. The executive is a president elected by popular vote (through electors, mere registrars as with us) for four years; by constitutional amendment of 1890, Dec. 20, he may be consecutively re-elected indefinitely. He is inaugurated the first of December following his election. There is no vice-president; temporary absences or disabilities are filled by the secretary of state; for permanent ones congress elects a provisional president till an election can be held. He has a cabinet of seven—foreign affairs (state); interior; justice and public instruction; *fomento* (patronage) of industry and colonization; communications and public works; finance and public credit; war and marine. The legislative body is composed of a senate and a chamber of deputies. The senate is composed of two senators (each with an alternate) from each state, and the federal district, indirectly elected; the term is four years, and half of them are chosen every two. The deputies are indirectly elected, one for every 40,000 inhabitants or fraction over 20,000; term two years; each has an alternate. There are two sessions of congress each year: a spring one, Apr. 1 to May 31 (specially continuable 15 days longer), to audit accounts and make appropriations; a second Sep. 16 (the national holiday) to Dec. 15, continuable 30 days longer, for general business. The judiciary is a supreme court of justice, with district and circuit courts. The former consists of a chief justice and 11 associates, 4 alternates, an attorney-general, and a public prosecutor; they are elected for six years by indirect popular vote. There are 3 circuit and 32 district courts. The state governments are much like the national in organization, save that in general the legislature has but one cham-

ber, and the governor is elected for four years. The states are divided into districts governed by prefects; the towns have councils called *ayuntamientos*. Despite the reserved rights of the states, the mining and commercial legislation was unified in 1883.

Finances and Banking.—The total revenue for 1908-9 was estimated at $103,385,000; the expenditures at $103,-203,824; the expenditures are estimated in budgets and held close to it. The interest on debt, army and navy, and public works, are the chief items of expenditure. The state revenues aggregate about $20,000,000, and the municipal $16,500,000. The funded debt in 1906 amounted to 445,899,961 pesos; the unfunded debt, including floating, non-interest bearing, and other debts, amounted to 860,495 pesos; or a total in United States currency of $222,058,181.

The aggregate capitalization of the chartered banks on Apr. 30, 1907, was $162,600,000; amount of notes in circulation, $99,072,830; bonds in circulation, $18,-450,400; reserve fund, $54,895,119; gold on hand, $48,-643,467; silver on hand, $17,713,981; notes of other banks, $6,745,973; loans on securities, $113,782,569; loans on mortgage, $22,685,381; call deposits, $33,426,-915; time deposits, $31,910,132; credit account, $316,-156,285; bills discounted, $198,874,703; investments, $25,741,761; debtor account, $264,005,180; value of buildings, $7,602,397.

The National Bank maintains branches in the cities of Chihuahua, Durango, Guadalajara, Guanajuato, Mazatlan, Merida, San Juan Bautista, Monterey, Oaxaca, Puebla, San Luis Potosi, Vera Cruz, Zacatecas, and Tampico; and the Bank of London and Mexico is similarly represented in Vera Cruz, Puebla, Quaretaro, Lerdo, Monterey, Guanajuato, Guadalajara, San Luis Potosi, Morelia, and Mazatlan. The Central Bank, of Mexico City, is practically a clearing house for the country banks throughout the republic, all of which own more or less of its stock and are its correspondents in the cities where located. The total banking capital of the republic, including banks of issue and all others which make their capitalization public, is $162,600,000 Mexican money. If to this amount be added the capital of the half dozen or more institutions which do not make this feature of their business public, or which are branches of foreign banks, as in the cases of the bank of Montreal and the International Banking Corporation, the grand total becomes considerably larger.

Army and Navy.—The strength of the permanent army is 3,259 officers and about 24,000 men; this force may easily be increased to 60,000 in time of war, and there is sufficient stock of equipment in the national arsenal at Mexico City for 100,000 men. The regular army is divided into 28 battalions of infantry, 1 battalion of sappers and miners, 14 regiments of cavalry

and 20 batteries of artillery. In addition to the regular is the first army reserve, consisting of the rurales (about 3,500 cavalry patrols under the interior department), the fiscal guard (1,000 cavalry in the customs service), and the state police organizations, in all about 26,000 men. Military education for officers is supplied at the Chapultepec Military Academy and at the Escuela Militar de Aspirantes at Tlalpam, a suburb of Mexico City. The navy consists of 4 gunboats of from 1,000 to 1,210 tons, 2 training ships, 1 small gunboat of 450 tons and several smaller craft. There is a naval academy at Vera Cruz.

Education.—The system has been revolutionized, or it may be said created, within a quarter of a century—that is, since President Diaz's accession. There is a great non-sectarian public school system supported by the national and state governments; primary education is nearly everywhere compulsory. The schools are divided into primary elementary, primary superior, and preparatory (professional and technical); the latter, for higher education, are found in the leading cities. In the federal district and the territories, the system is under the direct control of the executive. Churches and private associations also support many schools. The federal government likewise supports normal schools, schools of jurisprudence, commerce and administration, agriculture, veterinary, science, fine arts, and arts and trades for both sexes; a national conservatory of music, schools for the blind and mutes, reform schools, etc., besides museums and 17 libraries, the largest with over 150,000 volumes. According to the latest statistics the number of primary schools supported by the federal or state governments is 6,350, and by municipalities, 2,955; total, 9,305; and the attendance 484,570—males, 299,289; females, 185,281. There are 49 secondary and preparatory schools supported by the federal and state governments, with an attendance of 5,561, of which 4,056 are males and 1,495 females. There are 37 'professional' schools, with an attendance of 2,834, of which 1,667 are males and 1,167 females; total number of teachers and other employees of public schools, 18,024; expenses, $8,-454,329. Number of private schools, 1,790; number supported by the clergy, 437; and by associations, 150. Of these 2,339 are primary, 29 secondary, and 9 professional; attendance 60,087 males, 52,916 females—total 113,003. The grand total of schools of all kinds is 11,794 and attendance 605,968, of which 365,099 are males and 240,859 females.

The number of public libraries is 135, containing 743,559 volumes; number of museums 37, of which 9 are archæological, 7 scientific, 7 natural history, 1 geological and metallurgical, 3 agricultural, 1 medical and anatomical, 1 industrial, 2 commercial, and 6 miscellaneous. There are 56 scientific and literary societies and 429 publications, of which latter 10 are dailies, 10 tri-week-

lies, 30 semi-weeklies, 225 weeklies, 4 tri-monthlies, 57 semi-monthlies, 6 monthlies, and 11 irregular. Of the total number, 43 are official organs, 56 political, 36 religious, 41 scientific, 61 literary, 4 scientific and literary, 5 musical; 74 are devoted to general information, 12 to commercial topics, 14 to education, 16 to industries, 12 to art, and 65 to miscellaneous subjects and interests.

In 1900 there were 1,273,325 males and 906,263 females who could read and write; 163,568 males and 184,335 females who could read but not write; and 3,119,944 males and 3,664,680 females above the age of 12 years who could neither read nor write.

A law was enacted in 1888 but not put into force until 1896, making elementary education compulsory and compelling the establishment and maintenance of at least one public school for every 4,000 inhabitants. Under the provisions of this law the advance in education and educational methods throughout the republic has probably been without a parallel.

Religion.—The Roman Catholic is the dominant church of Mexico, but all other sects are tolerated. Mexico has 5 archbishops and 20 bishops. All religious orders are prohibited by law. The Jesuits have been expelled from the republic.

Archæology is represented by interesting relics of every conceivable description, exhibiting the aboriginal condition and progressive stages of culture among the many prehistoric and historic races that inhabited Mexican territory in pre-Columbian periods (see AZTEC CONFEDERACY). From the flaked flint arrowheads of the palæolithic savage to the elaborately carved gold and other ornaments, and vast stone buildings of the Aztecs and Toltecs of the Nahua nation, these relics are to be found in bewildering profusion. The number of minor statuettes, carvings, amulets, and ornaments in stone is enormous, as are also metal objects of the Bronze Age, and finely carved articles of wood and other material, in which the graving implements employed were of stone and copper, iron not having come into use. Even in the variety of their richly colored pottery, beautifully ornamented with elaborate and symbolic designs, is traced strong evidences of the separate tribes and nations, each possessing its individual and distinctive ware. All these relics bear mute testimony to the customs, habits, or religious rites of native races, for the study of which Mexico affords an inexhaustible and ever productive field, as witnessed by the recent travels and researches of Prof. Carl Lumholtz, the eminent ethnologist, among the primitive Huichols or Virarikas, a little known tribe of Indians in the state of Jalisco. These have added a vast amount of information on aboriginal ancestral rites and customs, the Huichols having carefully preserved traditions which include a ver-

sion of a flood which lasted for five years, and an ark which rested on a mountain in Mexico, instead of Mount Ararat, the representations of this ark, and Grandmother Growth, the Mother of the Gods who predicted the flood, being among the objects of superstitious veneration that are used in their ceremonials.

But the most impressive of Mexican archæological features are the ruins of monuments, temples and cities scattered throughout the land. Among these the more important are the cliff ruins and deserted pueblos of the Casas Grandes and other localities in the state of Chihuahua in the north; those of Quemada in Zacatecas farther south; of Tula, the northernmost centre of Toltec culture; the remains of chambers, statuary, etc., carved out of the solid rock on the hill of Texcocingo, a few miles beyond Texcoco; the pyramids, and the street of the dead, half a mile long, lined by *teocallis*, ruined temples and other structures, among which were found the Almaraz monolith, weighing over 18 tons, at San Juan Teotithuacan, 25 m. n. of Mexico City; the pyramid at Cholula, w. of the city of Puebla and about 60 m. s.e. of Mexico City, the largest in the country, upward of 1,400 ft. at its base, and nearly 200 ft. high, which was stormed and captured by Cortes, who replaced the Toltec temple, crowning its summit by a Roman Catholic church; the vast ruins on the oblong conical hill 2 m. in circumference and 400 ft. high at Xochialco, about 65 m. s.w. of Mexico City; and the remains of the six palaces, three pyramids, and other structures at Mitla, 15 m. s.e. of Oaxaca. Minor groups are to be found at Monte Alban, the ancient capital of the Zapotecs, Tehuantepec, and Zachila in Oaxaca; and at various places in the Huaxtecan and Totonacan districts, and the Maya region. Tenochtitlan, the Aztec capital, and Texcoco, the Acolhuan capital, were with the downfall of the inhabitants leveled to the ground by the Spaniards, and scarcely any vestige of their having existed is to be found. The site of Tenochtitlan is now occupied by Mexico City and the present cathedral is built where the great *teocalli*, reached by 120 steps, stood; here during excavations in 1789 were found two notable relics of the Aztec capital, the Calendar stone, and the Huitzilopochtli, a composite idol representing the cruel god of war and goddess of death. These are carefully preserved in the Muséo Nacionál in Mexico City, together with a vast quantity of other valuable archeologia, including numerous hieroglyphic and pictographic codices in the native ideographic writing, the decipherment of which is gradually adding to the sum of knowledge concerning ancient Mexico. See *Literature*. Consult: Bandelier, *An Archæological Tour in Mexico* (1885); Campbell, *Complete Guide and Descriptive Book of Mexico* (1885); Ober, *Travels in Mexico* (1898).

Literature.—In the summer of 1518 when a Spanish

squadron commanded by Juan de Grijalva discovered Mexico, then ruled by Montezuma II., he found there a highly developed nation with organized armies, official administrators, courts of justice, agricultural, mechanical, and fine arts, and stone buildings, some of them of vast proportions, and conspicuously ornamented. When the first ambassadors sent by the Mexican king to Cortes arrived, the Spanish conqueror was particularly impressed by the artists in their train, who in their pictographic and hieroglyphic writing made descriptive sketches of the Europeans and their accoutrements, in reality acting as our modern reporters, and giving the Old World the first idea of a new literature. The astonishment of European scholars and their researches into the origin of these hitherto unknown peoples gave rise to a whole literature. The details of ancient Mexican civilization are now generally admitted to be of Asiatic origin, and dating from an intercourse as recent probably as the Christian era. The Aztec calendar of 360 days divided into 18 months of 20 days each compared with that in use in eastern Asia exhibits marked points of similarity, and actual documents of native Aztec history in their ideographic writing, or copies of them, are open to the study of scholars, and are being deciphered and published from time to time. After the Spanish conquest, interpretations of many were drawn up in writing by Spanish educated Mexicans, and histories founded on them with the aid of the traditional memory were written by Fernando de Alva Ixtlilxochitl (1568—1648), the royal Texcucan chronicler, Tezozomoc, son of Cuitlahuac, the last Mexican emperor, and others. The documents purporting to be histories, written by natives in later times, thus more or less represent real records of the past, but the task of separating the preponderant mythical part from what is real history is of the utmost difficulty. Turning to the native chronicles of the Mexican nations, these are found to be substantial records, going back to the 12th or 13th c., with some vague but not worthless recollection of national events from times some centuries earlier. These last mentioned traditions, in some measure borne out by linguistic evidence of names of places, tribes, and persons, point to the immigration of detachments or branches of a widespread race speaking a common language, which is represented to us by the Aztec, still a spoken language in Mexico. Chief of these branches were the Toltecs, with whom is associated the mysterious tradition of Quetzalcoatl, a name which presents itself in Mexican religion as that of a great deity, god of the air, and in legend as that of a saintly ruler and civilizer. His brown and beardless worshippers described him as of another race, a white man with noble features, long black hair and full beard, dressed in flowing robes. He came from Tullan or Yucatan (stories differ widely)

and dwelt 20 years among them, teaching men to practice austerity and virtue, and to hate violence, war, human and animal sacrifices. Legends tell of his teaching picture-writing, the use of the calendar, artistic silver work, and building, of which the mound of Cholula and other edifices bear witness (see *Archæology*), but at last he departed, some say toward the unknown land of Tlapallan, but others to Coatzacualco, on the Atlantic coast, on the confines of Central America. Thence before his final disappearance he sent back his companions to tell the Cholulans that in a future age his brethren, white men and bearded like himself, would land there from the sea where the sun rises, and come to rule the country. About 1430 took place the triple alliance of the Acolhua, Aztec, and Tepanee kings, whose capitals were Tezcuco, Tenochtitlan, now Mexico, and Tlacopan. The Aztecs then became so predominant that the rest of native history may be fairly called the Aztec period, notwithstanding the picturesque magnificence and intellectual culture which made Tezcuco celebrated under Nezahualcoyotl and his son Nezahualpili (see AZTEC CONFEDERACY).

After the Spanish conquest, Mexico became the scene of active original study, and the foundations of the literature of the New World were laid, when in 1536 Juan Cromberger, the publisher of Seville, under the patronage and advice of viceroy Antonio de Mendoza and Juan de Zumarraga, first bishop of Mexico, established a printing press, with Juan Pablos as his foreman. The chief of early works relating to native history are those of Motolinia, *Historio de los Yndios de la Nueva Espana* (1541); Sahagun *Historia de las Cosas Antiguas de los Indios* (1566); Diego Duran *Historia de los Indios de Nueva Espana y islas de Tierra firme* (1581); the princely Tezozomoc, *Cronica Mexicana* (1600); Torquemada, *Monarquia Indiana* (1615); the *Letters of Cortes*, the standard edition of which is the handsome publication of Lorenzana (Mexico 1770); and the works of native authors including Camargo, Chimalpain, the three Ixtlilxochitls, Pomar, Tobar, Zapata and others. Early verse is represented by Saavedra Guzman, *El Peregino Indiano* (1599), and by Villagran's sprightly epic on the New Mexican conquest, both poor poetry, but interesting and valuable chronicling. From its establishment in 1536 to 1600 over 100 volumes were published by the native press, the bulk of a religious character including catechisms, vocabularies, sermons, etc., in the various Nahuan dialects, the remainder volumes of law, history, medicine, music, etc., in Latin and Spanish.

The Mexican literary celebrities of the 17th c. were Carlos de Siguenza y Gongora (1645—1700), the cosmographer of New Spain, professor of mathematics in the University of Mexico, the author of numerous scien-

tific and literary works in prose and verse; Enrico Martinez, *Reportorio de los Tiempos y Historia natural desta Nueva Espana* (1606; the Pueblan poet Matias Bocanegra; the poetess Juana Inés de la Cruz (1651—1695), surnamed on account of her attributes *The Tenth Muse,* who left the vice-regal court to become a nun; the dramatists Juan Ruiz de Alarcon and Eusebio Vela; and Fray Augustin de Vetancourt, whose *Teatro Mexicano* appeared in 1698. The 18th c. was comparatively barren of original work, but distinguished by general and classic culture and prolific in journalistic development and progress, the leaders of which were José Antonio de Alzate, Francisco Sagahun de Arevalo and José Ignacio Bartolache. Among writers of local history of this period are Veytia (1718—79) and Morfi (d. 1793).

The list of Mexican students, historians, and literary men of the 19th c. is a long one. Chief of local historians and a prominent statesman is Lucas Alaman (d. 1853) with *Disertaciones sobre la Historia de Mejico* (3 vols. 1844-9), and *Historia de Mejico* (5 vols. 1849-52); others of prominence are Orozco y Berra (1816—81), *Historia Antigua de Mejico;* Bustamente (d. 1848); Mora, Ramirez, and Zamacois; while of interest and value is the *Diccionario geografico, historico, y biografico de los Estados Unidos Mexicanos* (1889) of Antonio Garcia Cubas. Among the poets are the physician Manuel Carpio (1791-1860), best represented by *La Cena de Baltasar;* Guillermo Prieto (1818-97), poet and statesman, whose *Musa Callejera* (Highway Muse), and *Romancero Nacional,* made him the national laureate; Ignacio Manuel Altamirano, orator, poet, and novelist, whose novel *Clemencia* is his best known work; Salvador Diaz Miron; Juan de Dios Peza; Ancuña; and José Joaquin Fernandez de Lizardi, who has been named *El Pensador Mexicano.* Representative dramatists are Rodriguez Galván and Fernando Calderon, and in comedy Manuel E. Gorostiza (1789-1851), whose most popular works are *Contigo pan y Cebollas* and *Indulgencia para todos.* One great feature of modern Mexican literature is the moral and material support given by the Government, the Ministerio de Fomento (Ministry of Encouragement) supplying the funds for the issue of any work that—with a conservative judgment—is deemed worthy. Among recent examples are the historical works of the late Icazbalceta, and of Alfredo Chavero; the monographs of Peñafiel and Garcia-Cubas; the legends of Gonzalez Obregon, etc. Consult: Piementel, *Historia critica de la literatura y de las ciencas en Mexico* (1885); Lummis, *The Awakening of a Nation* (1899).

History.—According to native tradition, the history of ancient Mexico exhibits two periods, the first of which, that of the Toltecs, appears to have begun in the 7th and ended with the 12th century; while the second, that of the Aztecs, began 1200, and may be said to have been

closed by the conquest of Cortes 1519; for, though the race has maintained occupation of the Mexican territory, its existence as a nation ceased with the Spanish domination. The origin and primitive seats of the Toltecs are shrouded in mystery; it is said that they came from the n., from a locality designated Tullan, and whence they brought to the valley of Mexico the first elements of civilization. Their laws and usages stamp them as a people of mild and peaceful instincts, industrious, active, and enterprising. They cultivated the land, introduced maize and cotton, made roads, erected monuments of colossal dimensions, and built temples and cities, whose stupendous ruins in various parts of New Spain still attest their skill in architecture, and explain why the name Toltec should have passed into a synonym for architect. When Cortes conquered Mexico, 1519, many of these vast ruins seemed as ancient as now—their gigantic masses even then overgrown with forest trees. (See CHOLULA; PALENQUE.) The Toltecs knew how to fuse metals, cut and polish the hardest stones, fabricate earthenware, and weave various fabrics: they employed hieroglyphics (q.v.) for record of events, were acquainted with the causes of eclipses, constructed sun-dials, devised a simple system of notation, and measured time by a solar year, composed of 18 months of 20 days each, adding 5 complementary days to make up the 365, and intercalating 12½ days at the expiration of every 52 years, which brought them within an almost inappreciable fraction to the length of the tropical year, as established by the most accurate observations. These and other arts, with a mild form of religion, and a simple but just mode of administering the laws, the Toltecs bequeathed to the Aztecs, who engrafted upon the civilization of their predecessors many fierce and sanguinary practices in their religious, and many puerile usages in their social, life. Nothing is known of the exact time, and still less of the manner and causes, of the departure of the Toltecs from Mexico; but it has been conjectured that they went toward the south, and that the colossal architectural remains of the cities of Palenque, Uxmal, and Mitla, in Central America, are the work of their hands. The Aztecs, as we have said, imparted to the institutions of the Toltecs a tinge of their own sombre cruelty, and produced an anomalous form of civilization, which astonished the Spaniards by its mingled mildness and ferocity. Like the Toltecs and Chichimecs, a rude tribe who had succeeded them, the Aztecs came from the north, and after wandering from place to place, founded 1325 the city of Tenochtitlan, or Mexico. On the arrival of the Spaniards, their government was a confederacy of tribes, under the control of an elected chief. Their laws were severe, but justice was administered in open courts, the proceedings of which were perpetuated by picture-written records.

The Aztecs believed in one supreme invisible creator of all things, the ruler of the universe, named Teotl—a belief, it is conjectured, not native to them, but derived from their predecessors, the Toltecs. Under this supreme being stood many inferior divinities, each of whom had his sacred day and festival. At their head was the patron god of the Aztecs, the frightful Huitzilopochtli, the Mexican *Mars*. His altars were drenched with the blood of human sacrifice. Cortes and his companions (see DIAZ) were permitted by Montezuma to enter the temple in the city of Mexico, and to behold the god himself. 'He had a broad face, wide mouth, and terrible eyes. He was covered with gold, pearls, and precious stones; and was girt about with golden serpents. . . . On his neck, a fitting ornament, were the faces of men wrought in silver, and their hearts in gold. Close by were braziers with incense, and on the braziers three real hearts of men who had that day been sacrificed (Helps's *Spanish Conquest in America*, II., book x., chap. 4). The smell of the place, we are told, was like that of a slaughter-house. To supply victims for these sacrifices, the Aztecs made war on all the neighboring and subsidiary tribes, or in case of revolt in any tribute-paying city, and levied a certain number of men, women, and children by way of indemnity. The victims were borne in triumphal processions, and to the sound of music, to the summit of the great temples, where the priests, in sight of assembled crowds, bound them to the sacrificial stone, and opening the breast, tore from it the bleeding heart, which was either laid before the image of their god, or eaten by the worshippers, after having been carefully cut up and mixed with maize. In the years immediately preceding the Spanish conquest, not less than 20,000 victims were annually immolated. These atrocities were incongruously blended with milder forms of worship, in which fruits, flowers and perfumes were offered up amid joyous outbursts of song and dance. According to their mythology, Teotl, who delighted in these purer sacrifices, had once reigned in Anahuac (a name which at first probably applied only to the country in the immediate vicinity of the capital), in the golden age of the world, but being obliged, from some unexplained cause, to retire from earth, he departed by way of the Mexican Gulf, promising to return. This tradition accelerated the success of the Spaniards, whose light skins and long hair and beards were regarded as evidences of their affinity with the long-looked-for divinity. The Mexican priesthood formed a rich and powerful order of the state, and were so numerous that Cortes found as many as 5,000 attached to the great temple of Mexico. The education of the young of both sexes remained till the age of puberty in the hands of the priests and priestesses; and the sacerdotal class were thus able to exercise a widely-diffused influence, which, under the later rulers, was almost equal to that

of the emperor himself. The women shared in all the occupations of the men, and were taught, like them, the arts of reading, writing, ciphering, singing in chorus, dancing, etc., and even initiated in the secrets of astronomy and astrology.

On the arrival of Cortes, 1519, the Aztec leadership was held by Montezuma, an energetic prince, who, after his election to the office, which for several generations had been occupied by his ancestors, made successful war on the powerful neighboring state of Tlaxcala, and on Nicaragua and Honduras; after a time, however, he grew indolent, and alienated the affections of his subjects by his arrogance and exactions, and by his unremitting devotion to the services of the temples. According to the oracles which he frequently consulted, great changes were impending over the empire, the return of Quetzalcoatl was near at hand, and the fall of his race was impending. The tidings of the arrival on the coast of the expedition of Grijalva, 1518, terrified Montezuma and his priestly councillors; and when the hieroglyphic reports of his provincial officers announced the landing in the following year of Cortes and his companions, he endeavored to propitiate the dreaded strangers by sending an embassy charged with valuable gifts to meet them. The road to success was thus open to the Spanish captain, who, with a handful of men, advanced from San Juan de Ulloa to Mexico, and reduced the Aztecs, whose power crumbled to dust before the greater energy and superior civilization of their Christian invaders. In 1540, Mexico was united with other American territories under the name of New Spain, and governed by viceroys appointed by the mother country. The intolerant spirit of the Roman Catholic clergy led to the suppression of almost every trace of the ancient Aztec culture, while the strict system of sequestration enforced in Mexico crippled the resources of the colony; yet notwithstanding these drawbacks, Mexico ranked first among all the Spanish colonies in population, material riches, and natural products. It may be said to have vegetated for nearly three centuries in semi-quiescent prosperity, interrupted by few disturbances of any kind until 1810, when the discontent, which had been gaining ground against the viceregal power during the war of Spain with Napoleon, broke into open rebellion under the leadership of a country priest named Hidalgo. Hidalgo's defeat, and death by execution 1811, put a partial stop to the insurrection; but the atrocities committed under the sanction of the new viceroy, Calleja, exasperated the people, and gave irresistible impulse to the revolutionary cause. Guerrero and Iturbide in turn gained signal advantages over the Spaniards. For a time, Iturbide maintained a self-established imperial rule over the colony; but on the downfall consequent on his tyrannical abuse of power, a constitutional mode of government was inaugurated, and 1824 the independence of

Mexico, which had then chosen a federal republican form of government, was finally established, and in the following year definitely recognized by every foreign power, except Spain. The Mexican war was stained with excesses and atrocities on both sides; but the Spaniards gained unenviable pre-eminence by the wanton cruelty which characterized their conduct of hostilities. With them the war was one of extermination, every commander being allowed, at his own discretion, to hunt down and slaughter the insurgents like brutes. The welfare of the new republic was unhappily disturbed by constant outbreaks of civil war under the leadership of the Escosses, or aristocratic faction, and the Yorkinos, or democrats; and the history of a quarter of a century of independent power leaves little to recount beyond ever-recurring acts of violence, and the rapid and summary deposition of one president after another. In 1836 Texas secured its independence of the Mexican republic, for which it had struggled for several years; and at the same period differences arose with France, which were, however, brought to a peaceful conclusion after the taking of Vera Cruz 1838 by the French troops. In 1841 Gen. Santa Anna, on the retirement of Bustamente, succeeded in regaining the direction of affairs, from which he had been more than once deposed, and under the title Dictator exercised the power of an autocrat. In 1845 Mexico was compelled to recognize the independence of Texas, which was incorporated with the United States, whose troops having entered the Mexican territory, provoked a declaration of war by the Mexican government. Hostilities were carried on with great energy by both parties until 1848, when peace was concluded, after several bloody engagements, and after the city of Mexico had been stormed and taken by the Americans under Gen. Scott. (See MEXICAN WAR.) In 1852, after Santa Anna and Herrera had been in turn deposed and recalled to power, a revolutionary movement of more than ordinary importance brought Gen. Ceballos for a time to the head of affairs; but when the insubordination and arrogance of the soldiery threatened universal anarchy, Santa Anna was again recalled, 1853, Mar. 17. Having reorganized the army, and suppressed by the most cruel severity the insurrection of the federals, he declared himself president for life, and thus again rekindled civil war. In 1855 he had to flee from the country. Until 1867, confusion prevailed. Santa Anna was succeeded by Gen. Alvarez, who held office about two months, after whom came Gen. Comonfort, who was forced to resign 1858, when Gen. Zuloago assumed supreme power, but was almost immediately deposed by Gen. Robles. This person also proving a futility, Benito Juarez (q.v.) was elected; but his claims were contested by Gen. Miramon—head of the priestly and conservative party—and the country was again plunged into civil war. The acts of wanton aggres-

sion and flagrant injustice perpetuated on foreigners in Mexico during this period of internal disorder, during which the congress passed an act suspending all payments to foreigners for two years, could not fail to draw upon the Mexican government the serious remonstrance of those European powers whose subjects had just cause of complaint, and the result was to bring a fleet of English, French, and Spanish ships into the Mexican Gulf to enforce satisfaction. 1861, Dec., the British minister left Mexico, and the Spaniards disembarked a force at Vera Cruz, and took possession of the fort of San Juan de Ulloa, a step which was soon followed by the arrival before the former city of the allied fleet. A proclamation signed by the commanders-in-chief of the three naval divisions, and addressed by them to the Mexican people, elicited no satisfactory reply; and steps were accordingly taken to advance at once upon the capital. This measure alarmed the provisional government of Mexico, and brought about an armistice, with a view of negotiating a treaty for future regulation of commercial intercourse between Mexico and the great European powers. This treaty was drawn up and provisionally ratified by the different commanders, but not confirmed on the part of France, and consequently the French troops retained occupation of the Mexican territory after the English and Spaniards had declined to join in further hostile demonstrations, 1862, Apr., the French emperor formally declared war against the government of Juarez, who had assumed arbitrary rule as president of the republic.

After the declaration of war by the French, they issued a proclamation to the Mexican people, 1862, Apr. 16, setting forth that one of the objects of the contest was to rescue them from the tyranny of their president, and put the government of the country on a stable footing. Little faith, however, seems to have been put in these professions; and the invaders, though joined by Marquez, military leader of the clerical party, met little success till the arrival of Gen. Forey in September, with a reinforcement from France. Forey then took the command-in-chief, addressed a proclamation to the Mexicans, promising them perfect liberty in the choice of a new government in place of that of Juarez; and in the spring of 1863, concentrated the French troops, and marched on the city of Mexico. On his way, he took the strongly fortified city of Puebla after a two months' siege, capturing its defender, Ortega, and his whole force (May 18); and, Juarez having fled from the capital, and transferred the seat of his government to San Luis Potosi at their approach, the French entered Mexico, June 10. A fortnight afterward, a provisional government, headed by Gen. Almonte, was established, and an 'Assembly of Notables,' which was called (June 21) to deliberate upon the best form of government, decided in July, by a vote of 231 to 19, in favor of a 'Limited Hereditary Mon-

archy,' with a Roman Catholic prince for sovereign, under the title 'Emperor of Mexico,' and resolved in the first place to offer the crown to the archduke Ferdinand *Maximilian* (q.v.) of Austria; failing whom, to request the good offices of Emperor Napoleon III. in obtaining another monarch. That this resolution was the fruit of a general earnest wish on the part of the Mexican notables, the feeble and almost unwilling support that most of them accorded to their chosen emperor after his desertion by the French renders utterly improbable; but, on the other hand, there is no evidence that anything approaching intimidation or undue influence was exercised by the French. Most of the Mexican notables doubtless argued that a government supported by France would be sufficiently powerful to maintain the country in tranquillity, and in the hope of this long-wished-for result, cast in their lot for empire. These changes were, of course, vigorously protested against by the republican assembly at San Luis, and the two parties prepared with eagerness to try the fortune of war. Oct. 1, Forey departed from Mexico, and Gen. Bazaine took the command of the French forces, and began the campaign with vigor. The result of the winter's struggle was that in spring the imperialists were in possession of the whole country, with the exception of the four northern provinces. 1863, Oct. 3, Archduke Maximilian had given audience at his château of Miramar, near Trieste, Austria, to a deputation sent to offer him the crown, and had accepted it. 1864, May 29, the emperor and empress landed at Vera Cruz, and, June 12, made their public entry into the capital; and soon after the middle of the year, the imperialists had gained possession of every state in the kingdom, Juarez retreating northward and finally establishing the republican government at El Paso del Norte, now known by the name of Ciudad Juarez. As small parties of the republicans still maintained a guerilla warfare in various districts, Maximilian, 1865, Oct. 2, published a proclamation, menacing with death, according to the laws of war, all who were found in armed opposition to his government; the republic having ceased, not only by the express wish of the nation, but also by the expiry (1864, Nov. 22) of Juarez's term of office, and his flight beyond the frontiers; an amnesty, however, being accorded to such as submitted before Nov. 15. In accordance with this edict, Generals Arteaga and Salazar, who were defeated and captured Oct. 13, were shot on the 21st; and many hundreds of captured republicans were dealt with under the terms of the same severe order.

This contest in Mexico had from the commencement excited the liveliest interest in the United States, though the war of secession, then raging there, prevented any active interference in the affairs of the neighboring state. A general impression existed that France had taken advantage of the troubles of the United States to establish

its authority firmly on the American continent; and this belief, with the violation of the 'Monroe doctrine' by the establishment of imperialism in Mexico, induced the United States to give all their sympathy and diplomatic aid to Juarez and his supporters. 1865, Nov. 6, Sec. Seward forwarded a dispatch to Paris, in which it was stated that the presence of the French army in Mexico was a source of 'grave reflection' to the U. S. government, and that the latter could on no account allow the establishment of an imperial government, based on foreign aid, in Mexico, or recognize in that country other than republican institutions. This dispatch led to an interchange of diplomatic notes during the following six months; the Americans holding firmly to their first statement, and even intimating the probability of an armed interference on behalf of Juarez; till the French emperor, who was wearied with a contest so expensive and, though successful, so barren of lasting fruits, ultimately agreed, in the summer of 1866, to withdraw his troops from Mexico, having expended there about $40,000,000 The Belgian legion and some Austrian levies, however, were not included in this arrangement. Accordingly, from the autumn of 1866 till 1867, Feb., the French troops by degrees evacuated Mexico; there was a fresh rising of the Juarists, and constant gains were made by them. See MAXIMILIAN; JUAREZ.

May 15 the emperor was captured; he was tried, condemned, and, June 19, was shot, with his two generals, Miramon and Mejia. July 15 Juarez re-entered the capital, and, Oct., was re-elected president. Several insurrections followed in 1868-9, of which the most formidable was that of Angel Santa Anna, who was captured after 4 months, and with his followers was shot. 1871 Juarez was again elected, his competitors being Porfirio Diaz and Lerdo de Tejada; he died 1872, July 18. He was the first president who had held his office during an entire term; and he succeeded in his work of reconstruction so far as to insure something like a stable government for Mexico. He was succeeded by Don Sebastian Lerdo de Tejada, who had been minister of foreign affairs under Juarez, and was a skilled diplomat, and who maintained the affairs of the republic in a satisfactory condition. But his re-election, 1876, was followed by a revolution, headed by Gen. Porfirio Diaz, who drove out Lerdo de Tejada and his cabinet, and took control of the government. He succeeded in restoring the country to order and quiet. At the election, 1880, Gen. Manuel Gonzales was declared president. Under him the finances were brought into a very disordered state; and in 1884 Gen. Diaz was again elected to the presidency. He has since been re-elected at each national election and is still president. He is a strong and skilful ruler, and has the personal confidence of the country as an upright and patriotic man. There have been a few revolutionary outbreaks

during his administration, but he has promptly and vigorously suppressed them.

In 1905, July 1, President Diaz by proclamation abolished the *Libra Zone* or Free Zone, established about 1851, after Mexico had lost Texas, to encourage settlement and population on the Mexican border, by securing for the inhabitants cheap necessaries of life and as an incentive to the establishment of new industries. Extended at various times, the Free Zone, at the time of its abolition about 12 miles in width, stretched from the Gulf of Mexico along the valley of the Rio Grande and the New Mexico and Arizona frontiers to Tijuila on the coast of Lower California. At first all goods from foreign countries were imported into the territory free of duty, but later 11 per cent. of the full duties were required to be paid. The abolition of the Free Zone and the unification of duties were advantageous both to Mexican merchants in the interior and U. S. frontier merchants, the Zone, despite the best vigilance, offering too many opportunities for smuggling into Mexico, and back into the U. S.

The present general condition and prospects of Mexico are very good; peace and order are established, and the republic seems more firm than ever before. See Prescott, *Conquest of Mexico; Historia de Mexico;* Alaman and Brocklehurst, *Mexico To-day* (1883); Romero, *Mexico and the United States* (1898); Moses, *Constitution of the United States of Mexico* (1899); Salinas, *The Riches of Mexico and Its Institutions* (1893); Cubas, *Mexico: Its Trade, Industries and Resources* (1893); Chevalier, *Mexico, Ancient and Modern* (1864); Noll, *Short History of Mexico* (1890); *From Empire to Republic* (1903); Hale, *The Story of Mexico* (1891); Sierra and others, *Mexico: Its Social Evolution* (1904); etc.

MEX'ICO, or MEJICO: city, capital formerly of the Spanish colony of New Spain, present capital of the republic of Mexico: situated in the Federal District; 19° 20′ n. lat., 99° 5′ w. long.; nearly 7,500 ft. above sea-level, in the valley of Mexico, 2½ m. w. of Lake Texcoco; 292 m. by rail from Vera Cruz, on the Gulf of Mexico, 290 m. from Acapulco, on the Pacific, 863 m. from Matamoras, on the United States boundary. Pop. (1900) 344,721. This beautiful city is built on the site of the ancient Tenochtitlan, capital of the Aztec confederacy, on an extensive plateau of 1,400 sq.m., surrounded by lofty mountains and including five lakes. The principal streets of the city are regularly and well laid out, broad, clean, and well paved and lighted; but the buildings, both private and public, are low and of light architecture, in consequence of water being found in many parts of the city at only a few feet below the surface, and partly from apprehension of earthquakes. The Plaza Mayor, one of the finest squares in the western world, is bordered on one side by the cathedral, the largest and costliest church in

America, erected on the ruins of the great *teocalli*, or temple of the god Huitzilopochtli, titular god of the Aztecs. The cathedral, founded 1573, finished 1657, whose walls alone cost $2,000,000, is in form a Greek cross, 426 ft. long, 203 ft. wide: it has two naves, 20 side chapels, a sumptuous high altar, and an elaborately carved choir whose balustrade of rich metal is valued at $1,500,000. The interior is Doric, exterior Renaissance: its two open towers are 218 ft. high. Mexico has one of the finest collections of pictures in America, a national library of more than 100,000 volumes, with priceless literary treasures, and a mint which since 1690 has issued coinage, chiefly silver, to the amount of more than $2,000,000,000. The national palace, bordering the same square as the cathedral, consists of various buildings appropriated to offices of government. Mexico City contains many Roman Catholic and several Protestant churches and numerous charitable and correctional institutions; its penitentiary is a model in its class. There are schools of jurisprudence, medicine, agriculture, engineering, and an academy of the fine arts; there are several theaters and a circus. Its national museum is rich in all lines of science, in relics of national history, and in Aztec antiquities. In addition to the ordinary *alameda* or public walk of a Spanish city, Mexico City is remarkable for the extent and beauty of its *paseos*, or raised paved roads, planted with double rows of trees, which diverge far into the country from every quarter of the city. There are still many floating-gardens, or *chinampas*, for which the ancient city was celebrated; and, though they probably never floated, they form attractive objects in the midst of the surrounding swamps, which have now been scientifically drained. The trade is chiefly a transit-trade, though there are a few manufactures—e.g., cigars of superior quality, gold-lace, hats, carriages, saddlery, etc.; and these articles, together with gold and silver, and some of the numerous valuable natural products of the Mexican plain, are transported to Vera Cruz and other ports: in return the manufactured goods of Europe.

During the past 10 years the development of Mexico has been phenomenal. In 1880 there was only one railroad in the country—that from Vera Cruz to Mexico (292 m.)—and the great bulk of transportation was by mules. Gen. Grant's interest in the country and city did much to attract capital to both; and 1887 there were 4,000 m. of railroad completed and many more under construction. American, English, German, and some Spanish capital has been applied to the development of the vast natural resources of the country, and the enlargement of means of communication; at present the city is connected with the ports and chief towns in the country by the Mexican Central, National, and Mexican railroads. The valley of Mexico, surrounding the capital, is now

drained by a magnificent series of drainage works comprising nearly 37 m. of canal and tunnel; this work, completed in 1898, cost $20,000,000. The city has also an excellent system of modern sewerage, which was undertaken upon the completion of the drainage canal.

MEXICO, Mo.: city, county-seat of Audrain county; on Salt River, and on the Wabash and the Chicago & Alton R.R.'s; about 115 miles northwest of Saint Louis. Mexico was settled in 1833 and in 1852 was incorporated. It is an agricultural section, the chief products of which are wheat and corn. The manufactures are dressed marble, wagons, plows, flour, stove lining, fire-brick, and foundry products. Mexico is the seat of the Missouri Military Academy, and of the Hardin College for Women, founded in 1873. The charter under which the government is administered was granted in 1893, and provided for a mayor, who holds office for two years, and a council. Pop. (1900) 5,099.

MEX'ICO, GULF OF: basin of the Atlantic Ocean, about 800 m. in greatest width from n. to s., and about 1,100 m in greatest length westward from the s. point of Flórida; estimated area 800,000 English sq.m.; closed in by the United States on the n., by Mexico on the w. and s. Its outlet on the e. is narrowed by the jutting peninsulas of Florida and Yucatan, which approach within 500 m. of each other. In the middle of this entrance is the island of Cuba, dividing the strait into two—the Strait of Florida, 120 m. wide, between Cuba and Florida, and the Strait of Yucatan, 105 m. wide, between Cuba and Yucatan. The former or n. entrance connects the gulf with the Atlantic Ocean; the latter, or s., with the Caribbean Sea. The depth of water is supposed nowhere to exceed three-fourths of a mile, yet the gulf contains few islands—the Florida Keys, the deltas of the Mississippi, and a few on the coast of Yucatan, being the most important. The shores, which are very sinuous, form numerous bays, the largest of which is the Bay of Campeachy (q.v.). The coasts are mostly low and sandy or marshy, and are lined with numerous lagoons; good harbors are consequently not numerous, the best being those of Vera Cruz, New Orleans, Pensacola, and Havana. The gulf is visited by violent northern gales called *nortes*, which prevail after Sep., attaining their maximum force in Mar., and then immediately terminating. The most remarkable feature in connection with the Gulf of Mexico is the *Gulf Stream* (q.v.), which enters it by the s. channel, passes round it, and emerges through the Strait of Florida. Owing partly to the presence of this heated current, the temperature of the gulf is 8° or 9° higher than that of the Atlantic in the same latitude.

MEYER, *mī'ér*, GEORGE VON LENGERKE: diplomat; b. Boston, 1858, June 24. He graduated from Harvard Univ. in 1879, and while actively engaged in commercial

pursuits as director of several New England manufacturing enterprises, became prominent in civic affairs; was a member of the Massachusetts legislature, 1892-96; speaker of the house, 1894-96; chairman of the Mass. board of managers for the Paris Exposition; and in 1899 was elected member of the Republican National Committee. He was appointed ambassador to Italy in 1900; in 1905 succeeded Charlemagne Tower as ambassador to Russia, and became postmaster-general of the United States, 1907, Mar. 4.

MEYER, Heinrich August Wilhelm, Th.D.: 1800, Jan. 10—1873, June 21; b. Gotha. He was educated at the gymnasium at Gotha, and graduated from the Univ. of Jena 1820. In 1823 he became pastor of a church at Osthausen. In 1829 he published the first part of his great critical and exegetical commentary on the New Testament; the second part appeared 1832; and to the end of his life he was engaged on this great work, which was to have been completed in 16 divisions, but was not completed by him. New editions of the separate volumes were continually called for during his life, and he was kept busy revising and rewriting them from year to year. From the first his commentary was recognized, as it still is, as the most thorough, scholarly, and trustworthy work of the kind in existence. His method is the grammatico-historical, acutely critical, yet evangelical in spirit. An English translation of the commentary has been published in Edinburgh, edited by Drs. W. P. Dickson, of the Univ. of Glasgow, and F. Crombie, of St. Mary's College. Recently an American edition, edited by a number of leading biblical scholars, has been published. In its particular field, Meyer's work is still without a rival. In 1830 he published his valuable *Libri symbolici Ecclesiæ Lutheranæ.* He continued active as a pastor and superintendent, preaching regularly, until 1848; became general superintendent at Hanover 1861; and retired from official life in impaired health 1865, though still residing at Hanover, where he died.

MEY'ER, Johann George (known as Meyer von Bremen): 1813, Oct. 28—1886, Dec. 4; b. Bremen. Studied art at Düsseldorf, 1833-42; and opened a studio there, where he began painting religious subjects on a large scale. He soon changed his style to that in which all the works on which his fame rests have been executed. Filled with the spirit of Meissonier, he began that series of domestic subjects, with studies of children, on diminutive canvas, conceived with tenderest pathos, and executed in every minute detail with exquisite finish, which have made him famous and a general favorite not only in his own country, but also in England, France, and the United States. In 1852 he established himself in Berlin, and so great is the demand for his pictures, popular in theme, small in size, rich in color, and perfectly finished, adapting them peculiarly for home adornment and as parlor

pictures, that they are usually sold to private purchasers before they can be secured for the great exhibitions. Many of his best pictures have been engraved and have become familiar to the public. Such are *The Widow's Evening Prayer with Her Children, The Return of the Soldier of the Landwehr, The Very Small Brother, The First Prayer,* and others. The first and third of these were exhibited at the Paris exposition of 1855. Many of his paintings are owned in the United States.

MEYER, JOSEPH: German publisher: b. Gotha, 1796, May 9; d. 1856, June 27. He organized various industrial undertakings, founded a publishing business at Gotha, which soon attained large proportions, was removed by him to Hildburghausen (1828), and in 1874 was transferred to Leipsic. The best known of his publications is the *Meyers Konversationslexikon,* the rival of Brockhaus in the encyclopædia field, which has been brought down to date by constant revisions and supplements. He published also a series of the German classics, a *Historical Library,* and a *Library of Natural Philosophy.*

MEYER, KLAUS: German painter: b. Linden, Hanover, 1856, Nov. 20. He entered the Art School at Nuremberg in 1875, studied there 12 months, and subsequently became a pupil of Wagner and Lofftz at Munich. The result of their teaching, added to a patient study of the Dutch masters of the 17th century, appeared in the delicacy, vivid characterization and refined coloring of his work, which won him a place among the first of living Dutch painters. These qualities are exhibited in a Dutch interior produced by him (1882) in which are two figures in the costume of the 17th century. This work recalls the finest creations of Pieter de Hoogh and Van der Meer von Delft, although Meyer prefers an atmosphere of cool silver tone to the warm golden lights of those masters. Another interior, a Beguin monastery scene (1883) won for him the grand gold medal at the International Art Exhibition at Munich. He painted many pictures in a similar vein, such as *The Monastery School; The Singing Nuns; Old and Young Cats* (in the Dresden Gallery 1885); *The Spy,* an incident in the Franco-Prussian War; and *Lady Reading a Letter* (1892). In 1891 he was appointed instructor in the Art Academy at Carlsruhe, and 1895 professor in the Art Academy at Düsseldorf. At the Berlin Exhibition of that year he was awarded the grand gold medal.

MEYERBEER, *mī'ĕr-bār,* GIACOMO (known in Germany first as JAKOB MEYER BEER): celebrated musical composer: 1791 (or 4), Sept. 5—1863, May 2; b. Berlin; son of a wealthy Jewish banker. He was a precocious child, playing tunes on the piano spontaneously (it is said) as early as his fifth year. He began to study dramatic composition under Bernhard Anselm Weber; and 1810 entered the school of Vogler at Darmstadt, where he

formed an intimate friendship with the renowned Karl Maria von Weber. While at Darmstadt, he wrote a cantata, *Gott und die Natur.* Subsequently, he composed an opera, *Jephthah,* produced at Munich 1812; but though warmly admired by his friends, Vogler, Weber, and others, it fell flat on the audience, and was considered a failure. He then went to Vienna, where he acquired brilliant reputation as a pianist; but another opera which he produced here by command of the court, *Die beiden Khalifen,* was no more successful than the previous one. Italian music was the rage at the time, and nobody had a chance who did not imitate Rossini. Meyerbeer was induced by his friend Salieri to visit Italy, where he became an enthusiastic convert to the new Italian school, and began the composition of a series of operas which proved highly popular. Among these are *Romilda e Constanza* (performed at Padua 1819), *Semiramide* (Turin 1819), *Emma di Resburgo* (Venice, 1820), the first of Meyerbeer's compositions that excited a furor; *Margherita d'Anjou* (1882), *Esule di Granada* (1823), and *Crociato* (Venice 1825). The last of these afforded, perhaps, the most decisive proofs of the high genius of its composer, and was received with great applause in Paris, whither Meyerbeer then went to reside. In 1831 was produced, after numerous rehearsals, his grand dramatic opera *Robert le Diable,* which caused an excitement 'perhaps unparalleled in the history of the Parisian stage;' while it was received with nearly as great enthusiasm in England, Italy, Austria, and Russia, and later in America; and 1836, *Les Huguenots,* in which Meyerbeer reached the climax of his fame. His next opera, *Le Prophète* (1849), fairly sustained his reputation. It was followed by *Pierre le Grand* (1854), *Dinorah* (1858), and *L'Africaine* (1865).

MEYNELL, *mī'nĕl,* ALICE THOMPSON: English poet and essayist: b. London, England. She spent much of her childhood in Italy, and was married in 1877 to Wilfrid Meynell, a London journalist. She has published *Preludes,* a collection of poems (1875), illustrated by her sister, Lady Elizabeth Butler (q.v.); *Rhythm of Life* (1893); *The Color of Life* (1896); *The Children* (1896); *The Spirit of Place* (1898); *John Ruskin* (1900); *Later Poems* (1901); *The Flower of the Mind: a General Anthology of English Poetry* (1897); *Children of the Italian Masters;* etc. Consult: Archer, *Poets of the Younger Generation* (1902).

MEZEN, or MEZENE, *mĕz-ān':* district town in the govt. of Archangel, European Russia, 50 m. from the mouth of the river Mezen; remarkable for the salmon and herring fisheries which supply St. Petersburg with frozen fish during the winter. The river MEZEN, or Mezene, rises in the n. of the govt. of Vologda, European Russia, and flows n.w. into the White Sea, having a course of about 450 miles.

MEZEREON, *mĕ-zē'rĕ-ŏn* [F. *mézéréon*]: flowering shrub whose extremely acrid bark has been used in medicine as a diaphoretic in cutaneous and syphilitic affections, though it is a powerful irritant, and is of doubtful advantage; the bark of the *Daphne mezerĕum*, ord. *Thymelācēæ*. See DAPHNE.

MÉZIÈRES, *mā-zē-ār'*: fortified town of France, cap. of the dept. of Ardennes, on a bend of the Meuse, which washes its walls on two sides and separates it from Charleville (q.v.). It was strongly fortified by Vauban, and is defended by a citadel. It communicates with Charleville by a suspension-bridge. In 1815 the town held out for two months against the Allies, who besieged it after the battle of Waterloo. Over the n. aisle of the church is a bomb-shell, which has been sticking there ever since the town capitulated. In 1520 the Chevalier Bayard, with 2,000 men, successfully defended it against 40,000 Spaniards under Charles V. In the Franco-German war, 1871, Mézières capitulated after a cannonade of two days. Pop. 6,000.

MÉZIÈRES, ALFRED JEAN FRANÇOIS: French critic and politician: b. Rehon 1826, Nov. 19. He studied at the Ecole Normale and in Athens; was professor of literature at Nancy (1854-61), and at the Sorbonne; became an Academician in 1874; in politics is a member of the moderate Opportunists; and was deputy from 1881 to 1900, when he was elected senator for Meurthe-et-Moselle. Besides contributions to the *Revue des Deux Mondes* and *Temps* he wrote *Shakespeare* (1861); *Shakespeare's Predecessors and Contemporaries* (1863); *Shakespeare's Contemporaries and Successors* (1864); *Dante* (1865); *Petrarch* (1867); *Goethe* (1872-3); *In France* (1883); *Outside of France* (1883); *Mirabeau* (1891); *Dead and Living* (1898); etc.

MEZQUITE, *mĕs-kēt'*, Sp. *mĕs-kē'tā*: name of two Mexican trees or shrubs, of nat. order *Leguminosæ*, suborder *Papilionaceæ*, bearing pods filled with a nutritious pulp. The COMMON MEZQUITE (*Algarobia glandulosa*) is a small shrub, with stems often decumbent, and armed with strong straight spines. It is found in great profusion throughout vast regions, chiefly dry and elevated plains. In dry seasons, it exudes a great quantity of gum (*Gum Mezquite*), similar in quantity to gum-arabic, which seems likely to become a considerable article of commerce, and which has begun to be exported to San Francisco from the Mexican ports on the Pacific.—The CURLY MEZQUITE, or SCREW MEZQUITE (*Strombocarpa pubescens*), called also SCREW BEAN and TOURNIL, though only a shrub or small tree, is of great value in the wild and desert regions of western N. America, where it occurs with willow-bushes near springs of water. Its wood is used as fuel, and the pulp of its pods for food. The pods are spirally twisted into compact rigid cylinders, from an inch to an inch and a half in length.

MEZZANINE, n. *mēdz′ȧ-nēn* [It. *mezzanīno*—from *mezzano*, middle]: a low intermediate story between two higher ones.

MEZZO, a. *mĕt′zō* [It. *mezzo*, middle—from L. *medĭŭs*, middle]: in *music*, middle; mean. MEZZA-FORTE, moderately loud. MEZZO-PIANO, rather soft. MEZZA-VOCE, with moderated force of tone. MEZZO-ORCHESTRA, with half the orchestra. *Mezzo* alone, applying to the grand pianoforte, calls for use of the pedal, avoiding one of the sets of strings. MEZZO-RELIEVO, n. *mĕt′zō-rā-lē′vō* [It.: see RELIEVO]: middle or demi relief. MEZZO-SOPRANO, n. *mĕt′zō-sō-prȧ′nō*, a medium or half soprano: see SOPRANO; the female voice so called; the person having such a voice: ADJ. having a medium compass of voice, between the soprano and contralto, said of a female voice.

MEZZOFANTI, *mĕd-so-fȧn′tē* or *mĕt-so-fȧn′tē*, GIUSEPPE, Cardinal: remarkable linguist: 1774, Sep. 17—1849, Mar. 15; b. Bologna, where he received his education, and subsequently (1815) received the office of university librarian. In 1831 he settled in Rome, and was advanced to the dignity of a Monsignore; 1833 he was appointed sec. of the College of the Propaganda; then keeper of the Vatican Library; and 1838 he was raised to the dignity of cardinal. He died at Rome. M.'s European reputation was founded not on any literary or learned works that he wrote, but on the almost miraculous extent of his linguistic acquisitions. Toward the end of his life, he understood and spoke 58 different tongues. As early, indeed, as 1820, Lord Byron called him 'a walking polyglot, a monster of languages, and a Briareus of parts of speech.' He was not in the strict sense a critical or scientific scholar; yet, though his linguistic skill lay chiefly in verbal knowledge, his acquirements in other departments were considerable. See Russell's *Life of Cardinal Mezzofanti* (Lond. 1858).

MEZZOJUSO, *mĕt-sō-yô′sō* (Arab. *Menzil-Jussu*, village of Joseph): town of Sicily, province of Palermo, 18 m. s.s.e. of Palermo city. It is one of the four colonies of Albanians, who, on the death of Scanderbeg, 15th c., fled to Sicily, to avoid the oppression of the Turks. They preserve their language to a great extent, and in religious observance follow the Greek ritual, their priests being allowed to marry; but, except on fête-days, they are not distinguishable in feature or dress from the peasantry of the rest of Sicily. Pop. 6,700.

MEZZOTINT, n. *mĕz′zō-tĭnt* or *mĕt′zō-tĭnt*, or MEZ′ZO-TIN′TO, n. *-tĭn′tō* [It. *mezzotinto*—from *mezzo*, middle, half; *tinto*, tint—from L. *tinctus*, dyed, tinged]: style of engraving on copper in imitation of Indian ink (see ENGRAVING): a certain style of drawing.

MGLIN, *mglēn:* town of Russia, govt. of Tchernigov, 125 m. n.n.e. of the town of Tchernigov. There is a large cloth-factory, and a considerable number of German families. Pop. 7,000.

MHENDIGUNJ′: town of British India, territory of Oude, 90 m. s.e. of Lucknow, 3 m. s. of the right bank of the river Saee. It is a busy, thriving place. Pop. estimated 20,000.

MHOW, *mhow:* town of British India, territory of Indore, 13 m. s.w. of the town of Indore, near the Vindhyan Mountains, on an eminence on the Gumber river. Near it are the cantonments, which have altogether the appearance of a European town, having, on an eminence, a church with steeple, a spacious lecture-room, a well-furnished library, and a theatre. They are 2,019 ft. above sea-level. Pop. of M. 36,000.

MI, *mē* [It. and F.]: in *music*, the third note of the scale = E.

MIAGAO, *mē-ä′gô-ō:* town in the island of Panay, one of the Philippine Isles, province of Iloilo. The inhabitants are industrious, comfortable, and well educated. Pop. (1899) 22,100.

MIAKO, *mē-ä′ko*, or SAI-KIYO, *sī-kē′yo:* ancient cap. of Japan: see KIOTO.

MIAMI, *mī-äm′ī* or *mē-äm′ē*, RIVER: stream in Ohio, rising by several branches in the w. centre of the state, and after a s.s.w. course of 150 m. through one of the richest regions of America, past the important cities of Dayton and Hamilton, empties into the Ohio river, 20 m. w. of Cincinnati. It is sometimes called Great M., to distinguish it from Little M., a smaller river, which runs parallel to it, 15 to 25 m. e., through the Miami Valley.

MIAM′IS: tribe of Algonquin Indians whom the French met near Green Bay, Wis., 1658. About 8,000 of them also were found, 1670, at the head of the Fox r., living in a palisaded village, in houses of matting, and displaying higher character and social relations than usual among the northern tribes. In 1683 they were attacked by the Iroquois, on the St. Joseph r., and at the same time were at war with the Sioux. In 1686 they came into collision with the French, and finally made agreement with the English, joining the Iroquois against the Hurons, and threatening the Chippewas. In 1705 the French involved them in a war with the Ottawas. At the outbreak of the French and Indian war, they hesitated which side to join, but on the whole favored the English, and, 1751, were attacked by the French. Afterward they joined Pontiac, and took the British forts Miami and St. Joseph's. During the Revolution they sided with the English, but were forced to make peace by Clarke; but a hostile attitude against the encroaching settlers was maintained, until, 1790, Gen. Harmar was sent against them. Under Little Turtle their 1,500 warriors defeated Gen. Hardin twice, also Gen. St. Clair;

Gen. Wayne, however, routed them, 1794, Aug. 20, at Maumee rapids; and, 1795, peace was concluded. They ceded their lands after this, and rapidly declined in character and numbers. They joined in Tecumseh's movement, but were defeated, and made peace 1815, Sep. 8. After various cessions of land and treaties, they were, 1846, removed to the Ft. Leavenworth, Kan., reservation. In 1873 only about 150 of them remained, who were removed to the Quapaw reservation.

MIANTONO'MOH: Indian sachem of the Narragansett tribe, successor, 1636, of his uncle Canonicus. He was friendly with the early colonists of Mass., and on their side in the Pequot war. But later (1642) he attacked the Mohegan sachem Uncas, who captured him at Norwich, Conn. Uncas submitted his case to the commissioners of the colonies, who decided that M. had shown himself a dangerous public enemy; whereupon Uncas's band tomahawked him, on the plain, since called Sachem's Plain, now marked by a monument erected 1841.

MIASKITE, or MIASCITE, n. *mĕ-ăs'kĭt* [*Miask*, in Siberia]: a granite rock, consisting of cleavable white felspar, black mica, and grayish or yellowish-white elæolite with some hornblende.

MIASMA, n. *mĭ-ăz'mă*, or MIASM, n. *mĭ-ăzm'* [Gr. *miasma*, defilement—from *miainein*, to stain, to pollute: It. *miasma:* F. *miasme*]: noxious exhalation floating in the air, arising from decaying, diseased, or poisonous substances: often in the plural MIASMATA, *mĭ-ăz'mă-tă*, malaria. MIAS'MAL, a. *-măl*, containing miasma. MIASMATIC, a. *mī-ăz-măt'ĭk*, pertaining to miasma, or containing it.—*Miasma* is often popularly identified with MALARIA, though malaria refers rather to the *air* as tainted with noxious effluvia. A familiar form of Miasma is the poisonous exhalation arising from marshes. It is proved by the experience of all ages that there is intimate connection between marshy districts and certain diseases, especially the various forms of intermittent and remittent fever; but the exact nature of the noxious agent, and the circumstances on which its formation and extrication depend, are not fully known. M. is clearly neither heat nor moisture; for the crews of clean ships cruising in the tropics, at a distance from land, are usually very healthy; nor is it any known gas extricated from the marsh, for the gases collected by stirring up marshes (carbonic acid, nitrogen, oxygen, and carburetted hydrogen) may be inspired without giving rise to any malarial symptoms. It may be regarded as established that the noxious agent is a product of vegetable decomposition under certain conditions of heat and moisture. This is inferred from the fact that this special morbific influence is nowhere so powerful as in the deltas and along the banks of large tropical rivers, which, in their flood, bring down the washings of the soil, full of vegetable remains, which, by the subsidence of the waters,

are left reeking in the hot sun. Moreover, the poison has been traced, in various places in Italy, France, and the Netherlands, to the practice of steeping flax in stagnant waters, and even in streams; and in India, it was formerly the custom, after extracting the coloring matter from indigo, to throw the remains of the plant into large heaps, which, in the course of three years, became excellent manure: it was found, however, that these heaps, alternately soaked by the heavy rains and heated by a tropical sun, decomposed and emitted miasmata precisely similar in their effects to those produced by marshes. Marsh-miasmata are seldom evolved at a temperature under 60°, but at and above 80° they are prevalent and severe; and the nearer the equator, the more violent, as a general rule, do they become. Although moisture is necessary to the evolution of miasmata, an excess of it often acts as a preventive, and by impeding the access of atmospheric air, retards or prevents decomposition. This explains the apparent anomaly of an uncommonly rainy season producing opposite effects in different localities, sometimes not distant from one another. Thus, in the W. Indies, a very rainy season induces general sickness in the dry and well-cleared island of Barbadoes; while at Trinidad, whose central portions are 'a sea of swamp,' and where it rains nine months in the year, the excessive rain is a preservative from sickness; for in the seasons when rain falls only eight months or less, the swamps become dry and exposed to the sun, and severe remittent fevers are sure to follow.

Chemistry has hitherto failed in detecting any special ingredient to which the air evolved by marshes owes its poisonous qualities. The air collected in the most poisonous districts gives, on analysis, the same gases existing in the same proportions as normal air; nor (if we except the observations of Boussingault, not yet confirmed by other chemists) does it give evidence of the presence of any organic body.

The infecting distance of this poison is a subject of great practical importance; and both the altitudinal range and the horizontal spread have to be noticed. In Italy, it is estimated that an altitude of about 1,500 ft. assures exemption from marsh-poison; while in the W. Indies an elevation of at least 2,000 ft. is necessary. From observations by Sir Gilbert Blane, during the ill-fated Walcheren expedition, it appears that, in Europe, the horizontal spread of marsh-miasmata over fresh water is less than 3,000 ft.; but over salt water—at all events, in the tropics—the horizontal range is greater. The extent to which the poison may spread horizontally over land is a much more complicated question, and depends largely on the nature of the soil. The effect of trees in intercepting miasmata is remarkable, and is probably due partly to their condensing the vapors of the marsh, and partly to their altering the direction of the current of air. Pope Benedict XIV. caused a forest to be cut down which separated Villatri from the Pontine Marshes, and in con-

sequence, for many years, there was a most severe and fatal fever in a district previously healthful; and the same results have in many other cases followed the removal of trees.

In districts where this poison exists, it is found by experience that those who go out of their houses only during the day, after the morning fogs have dispersed, and before the evening mists appear, often escape the bad effects; and a full meal, with a few grains of quinine, before exposure to the morning air is found protective by travellers in a malarious district.

Dr. Wood of Philadelphia has pointed out the extraordinary and very important fact, that miasmata are usually neutralized, decomposed, or in some other way rendered innocuous by the air of large cities. Though miasmatic diseases may rage around a city, and even invade the outskirts, yet they are unable to penetrate into the interior, and individuals who never leave the thickly-built parts almost always escape. What in the air of the city is thus incompatible with the miasmatic effect of marshes, is unknown; but probably the protection is connected with the results of combustion, for the fire and smoke of camps are asserted to have had the same effects.—See ENDEMIC.

MIAUL, v. *mē-owl′* [an imitative word: F. *miauler*, to mew as a cat: It. *miagolio*, the caterwauling of a cat]: to cry or caterwaul as a cat. MIAULING, imp. *mē-owl-ĭng*, crying as a cat: N. the cries or crying of a cat. MIAULED, pp. *mē-owld′*.

MIAUTSÉ, *mē-ow-tsā′:* tribe of the aborigines or hill-tribes of China. From the dawn of Chinese history, we find the people of the plains contending against those of the high lands, and to the present day many of the hardy mountaineers have maintained practical independence. They consist of numerous uncivilized tribes, occupying large mountainous portions of Kwang-se, Kwei-chow, Yunnan, Sze-chuen, and adjacent provinces. Some of them own Chinese sway; but over many portions of them noreal jurisdiction is ever attempted by the Chinese govt., which contents itself with a shadowy claim of sovereignty: these govern themselves on a patriarchal system. The M. are smaller than the Chinese, and unlike in features as in character. Their dialects are various, and wholly different from the Chinese. The M. of w. China are of the same stock as the Shans and Karens of Siam and Burmah.

MIAVA, *mē-ŏh′vŏh:* market-town of n.w. Hungary, on the Miava, an affluent of the Morava, 48 m. e.n.e. of Presburg city. There are manufactures of woolen cloth and bagging, and hemp and flax are cultivated. Pop. about 11,000.

MICA, n. *mī'kă* [Sp. and F. *mica*—from L. *micārĕ*, to sparkle, to glitter]: a mineral, called also *Muscovy Glass*, consisting essentially of a silicate of alumina, with which are combined small proportions of silicates of potash, soda, lithia, oxide of iron, oxide of manganese, etc. By these and slight external differences, mineralogists have distinguished numerous species. MUSCOVITE, or COMMON M., also called POTASH M., contains a notable but variable proportion of silicate of potash; also a little fluorine. It is a widely diffused and plentiful mineral, entering largely into the composition of granite, mica-slate, and some other rocks, veins and fissures of which it also often fills. It has a strong, often almost metallic lustre. It is remarkable for the readiness with which it splits into thin elastic plates, generally transparent, or at least translucent. The thinness and elasticity of these plates readily distinguish them from those of talc, and of the laminated variety of gypsum; also they are devoid of the greasy feel of talc. They are sometimes not more than one-300,000th of an inch in thickness, are mostly quite transparent, and were formerly much used in setting objects for the microscope; but for this purpose thin glass is now generally preferred. Plates of M., often a yard across, are found at the M. quarries at Acworth, N. H., also near Lake Baikal in Siberia, and in China. They occur of large size also in Sweden and in Norway; and the mineral is found in large masses in St. Dennis and other parts of Cornwall, England. In Siberia, China, Peru, and elsewhere, M. is substituted for glass in windows. At one time it was used for this purpose in the Russian navy, not being liable, like glass, to be broken at the discharge of cannon. It is sometimes preferred to glass for lanterns, and especially for the fronts of stoves, as not liable to break with sudden change of temperature. It is useful also for the mounts of natural history objects which are to be put in spirit, being more easily bored than glass. In India, small pictures are frequently painted in distemper on mica. Muscovite is usually colorless or of pale amber tint, but it occurs also white, gray, brown, green, dark olive, and, rarely, rose-red. It is found sometimes in beautiful crystals, generally rhombic or in six-sided tables.—LITHIA M., or LEPIDOLITE, occurs massive in a scaly-granular form at Rozena in Moravia, of fine purple or reddish-violet color. This is a very beautiful mineral, and, like jasper, lapis-lazuli, etc., is made into ornaments. That found in Great Britain is not of such delicate color as that found in Moravia.—MAGNESIA M., or BIOTITE, contains about as much magnesia as alumina. It is often dark green. MICACEOUS, a. *mĭ-kā'shŭs*, pertaining to or containing mica. MICA'-CEO-CALCA'REOUS, *mī-kā'shĭ-ō-*, partaking of the nature of, or consisting of, mica and lime, applied to mica-schist (q.v.) containing carbonate of line.

MICADO, n. *mĭ-kâ'dō:* see MIKADO: TYCOON.

MICAH, *mī'ka:* sixth (third in the LXX.) of the 12 minor prophets of Israel; b. probably at Moresheth, near Gath, in Judah. He prophesied mostly in Jerusalem, during the reigns of Jotham, Ahaz, and Hezekiah (B.C. 722—prob. B.C. 711), and was therefore contemporary with Isaiah, and Hosea, and Amos. — His prophecy forms the BOOK OF MICAH, a canonical work of the O. Test.; divisible into three parts, each commencing 'Hear ye;' organically connected, however, with each other, and showing even a progressive development of idea in the mind of the writer. The natural divisions are: i. 2—iii. 1; iii. 1—vi. 1; vi. 1—vii. 20. The destruction of Samaria (Israel), the danger and subsequent captivity of Judah, the wickedness of the rulers, the punishments that overtake the land, the glorious restoration of the theocracy, Jehovah's 'controversy with his people' on account of their sins, his warnings, his exhortations, and his sublime promise of forgiveness, form the principal points of M.'s prophecies, which relate to the invasions by Shalmaneser, Sennacherib, the Babylonian exile, the return, and the re-establishment of the theocracy under Zerubbabel. Through the nearer cycle of predicted events, the prophet gives distant visions of the Messiah: the announcement that Bethlehem should be the place whence Messiah should come has always commanded attention (Mic. v. 1–15; comp. Matt. ii. 5, 6; Jn. vii. 42). The style of Micah is clear, vivid, concise, yet richly poetical; some passages, especially in the beginning and the last two chapters, are among the noblest in the Old Testament. The play upon words, noticeable in Isaiah, is a marked feature of this writer also.

MI'CA-SCHIST: next to gneiss, one of the most abundant of the Metamorphic Rocks (q.v.). It consists of alternate layers of mica and quartz, but is sometimes composed almost entirely of the thin and shining plates or scales of mica, and from this it passes by insensible gradations into clay-slate. The quartz occurs pure in thin layers like vein-quartz. Garnets are in some districts abundant in this rock, making up a large proportion of the whole mass. M.-S. is believed to be a highly altered shale or clay deposit, and the component minerals, including the garnets, to have been developed under the influence of metamorphic action from materials already existing in the unaltered strata. In many places, the M.-S. has a finely corrugated or wavy structure.

MI'CA-SLATE: a metamorphic rock, widely distributed, composed principally of mica and quartz, but sometimes containing felspar. It resembles Mica-Schist (q.v.) in some respects, and clay-slate in others, but is not usually classed with either. It contains a larger proportion of clay than the former, and the mica appears in smaller particles; in some specimens the mica can scarcely be detected without a glass. The rock usually presents a foliated appearance. Hydromica schist, or slate, con-

tains hydrous mica with a small proportion of quartz. To the sense of touch it is like Talc (q.v.), and was formerly called talcose slate, but has been found entirely devoid of talc.

MICE, *mīs:* plu. of MOUSE, which see.

MICH, or MICHE, v. *mĭch* [Swiss *mauchen*, to conceal: F. *musser;* prov. F. *mucher;* OF. *mucer*, to hide, to skulk]: in *OE.*, to skulk; to lie hid out of view. MICH'ING, imp. MICHED, pp. *mĭcht.* MICH'ER, n. *-ĕr*, one who.

MICHAEL, n. *mī'kĕl:* a fine variety of sweet oranges, from the island of St. Michael, one of the Azores.

MI'CHAEL (or MIKAIL) FEODOROVITCH (ROMANOFF): see ROMANOFF.

MI'CHAEL VIII., surnamed PALÆOLOGUS, Emperor of Constantinople: see PALÆOLOGUS.

MICHAEL, *mī'kā-ĕl* or *mī'kĕl*, THE ARCHANGEL: the only archangel, or prince of the angels, named in the Bible; though post-exilian Jewish and popular Christian angelology have added others, to the number of seven, creating thus the highest order in the angelic hierarchy (see ANGEL: ARCHANGEL). M. is referred to in Dan. x. 13, 21; xii. 1; Jude 9; Rev. xii. 7. The Rabbinical traditions practically identifying M. with the Messiah are purely conjectural; though some Christian scholars have found reason for such conjecture in the Scriptural representation of M. as the great prince and leader of Israel. M. appears indeed as the type and leader of the children of God in their antagonism to heathen power, and their continual strife against Satan and his hosts—the great military leader who stands up with them and fights for them in the power of God. His contention with the devil about the body of Moses (Jude 9) seems an allusion to the Jewish tradition that, when M. was sent to care lovingly for Moses's body (see Deut. xxxiv. 6), he was withstood by the devil, who claimed it because the blood of the Egyptian (Ex. ii. 12) was on Moses's hands. (Cognate is Zech. iii. 1.)—M. is one of the saints in the Rom. Cath. calendar, and in that of the Prot. Episc. Church: see MICHAELMAS DAY.

MI'CHAEL-AN'GELO BUONAROT'TI: see MICHEL-ANGELO.

MICHAELIS, *mē-ĉhâ-ā'lĭs*, JOHANN DAVID: eminent biblical scholar: 1717, Feb. 27—1791, Aug. 22; b. Halle, where his father, Christian Benedict M., theologian and orientalist, was professor. After completing his studies at his native university, he travelled in England and Holland. In 1745 he became prof. of philosophy at Göttingen, and was active in forming a scientific assoc. there. 1753–70 he was one of the editors of the *Göttinger gelehrten Anzeigen*, and for some years he was librarian to the university. During the Seven Years' War, he made preparations for an expedition of discovery in Arabia, which was afterward made by Niebuhr.

In the latter years of his life, he was almost always in the professorial chair or at his desk. Michaelis was a man of vast attainments in history and archæology, and his labors were of great importance in the departments of Biblical Exegesis and History. He may be regarded as among the earliest of the critical school of German theologians, but he lived at too early a period to acquire anything like a consistent or systematic theory of the genesis of the Hebrew scriptures. He loved to rationalize in details, and was never quite certain what to think about inspiration; at all events, he seeks constantly to prove how thoroughly *human* the Mosaic legislation was, though he does not exactly deny its claims to being considered a divine revelation. Though with a decidedly rationalistic bent in theology, he always claimed to be orthodox; but he confessed that he could not subscribe fully to the Lutheran articles. He was deficient in imagination, and his works, very important in their influence on Hebrew study at the time, are now little read. Many of his pupils became professors, and disseminated his principles through the German universities.

Michaelis' chief works are *Einleitung in die göttlichen Schriften des Neuen Bundes* (2 vols. Gött. 1750; English by Bp. Marsh); *Mosaisches Recht* (6 vols. Frankf. 1770-75; English by Dr. Alexander Smith 1814); and *Moral* (3 vols. Gött. 1792-1823). See his *Lebensbeschreibung von ihm selbst abgefasst* (Rinteln und Leip. 1793).

MICHAELMAS, n. *mĭk'ĕl-măs* [after St. *Michael*, the archangel, and *mass*]: the feast of the archangel Michael, Sep. 29; thence sometimes equivalent to Autumn. This feast of the Rom. Cath. Church is said to have been instituted 487, in honor of all the angels with Michael at their head. The Greek and other Eastern churches observe it; also the Church of England, and the Prot. Episc. Church in the United States. MICHAELMAS-DAY is one of the English quarter-days for payment of rent by tenants—viz., Sep. 29. MICHAELMAS TERM is one of the four legal terms during which the English courts of law and equity sit daily for dispatch of business. It begins Nov. 2, and ends Nov. 25. Michaelmas Head Court was the name given in Scotland for the annual meeting of heritors or freeholders of each county to revise the roll of freeholders.

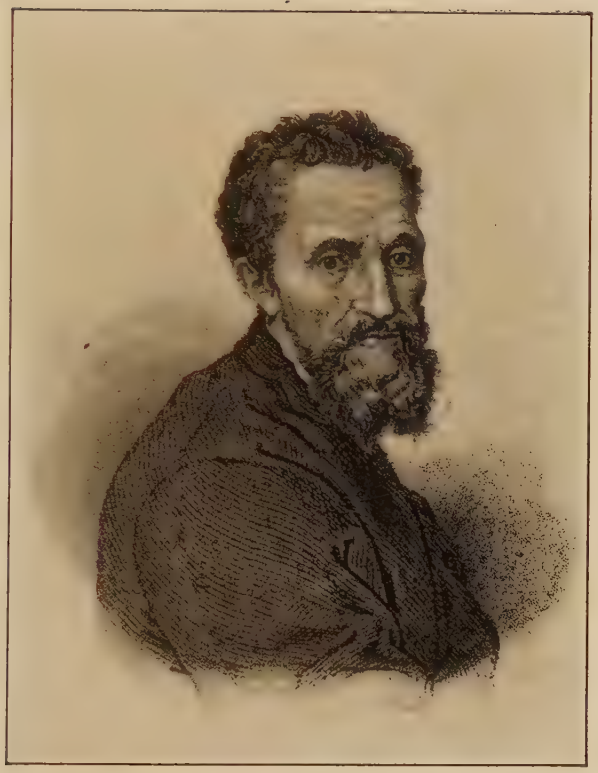
MICHEL, *me-shĕl'*, LOUISE: French communist, author, editor of *La Révolution Sociale:* b. Vroncourt, Upper Marne, 1830, May 29; d. Paris 1905, Jan. 9. Louise was a favorite at the château where her mother was a servant, and was well educated. When about 18 years of age she went to Paris, and taught in a school at Montmarte until the communal uprising 1871. She embraced the cause of the Commune with fierce enthusiasm, fought in the ranks with the insurgents, was tried by court-martial and sentenced to death. Sentence was commuted to transportation to New Caledonia. She was amnestied

1880 and welcomed in France by 30,000 people. She resided in Paris, caring for her aged mother, writing and lecturing in favor of the Commune. She hated religion and would have destroyed the order of society by fire and sword; but was kind to children and animals, and self-sacrificing in behalf of the poor. Her courage, honesty, and ability were unquestioned. She was shot and seriously wounded while addressing a meeting of anarchists 1888. In 1890, Mar., she completed the libretto of a comic opera entitled *Dans la Lune.*

MICHELANGELO, *me-kĕl-ân'jā-lo* (BUONARROTI, *bô-o-nâr-rŏt'ē*): almost unrivalled as painter, sculptor, architect, in an age when Christian art had reached its zenith: 1475, Mar. 6—1564, Feb. 18; b. Chiusi, in Italy. He was of noble origin, descended on his mother's side from the ancient family of Canossa, in Tuscany, while the Buonarroti had long been associated with places of trust in the Florentine republic. Michelangelo learned the rudiments of painting from Bertoldo, pupil of Domenico Ghirlandaio; and having been admitted as student into the seminary established by Lorenzo the Magnificent for the study of ancient art in connection with the collections of statuary in the Medicean Gardens, he attracted the notice of Lorenzo by the artistic skill with which he had restored the mutilated head of a laughing faun, and was received into the palace of the Medici, where he spent several years. Lorenzo's death 1492, and the temporary reverses which befell the Medici family in consequence of the incapacity of his successor, Piero, led Michelangelo to retire to Bologna, whence he soon removed to Rome, whither his fame had preceded him. His earliest original works were a *Kneeling Angel,* executed for the grave of St. Dominic, at Bologna; the statues of Bacchus and David, at Florence, and a magnificent group representing the *Mater Dolorosa,* which was placed in St. Peter's, at Rome. The *David,* an impressively powerful colossus, the amazement of the youthful artist's contemporaries, was removed 1873 to a hall in the Acad. of Fine Arts. Next in order of time, and, according to some of his contemporaries, first in merit, ranks Michelangelo's great cartoon for the ducal palace at Florence, which, with the pendant executed by Leonardo da Vinci, has long since perished. This work, which represented a scene in the wars with Pisa, when a number of young Florentines, bathing in the Arno, are surprised by an attack of the Pisans, showed so marvellous a knowledge of the anatomical development of the human figure, and such extraordinary facility in execution, that it became a study for artists of every land, and created a new era in art. Pope Julius II. called Michelangelo to Rome, and commissioned him to make his monument, which was to be erected within St. Peter's. Although this work was never completed on the colossal scale on which it had been designed, and was ultimately erected in the Church of St. Pietro ad Vincula,

it is a magnificent composition, and is memorable for having given occasion to the reconstruction of St. Peter's on its present sublime plan, in order the better to adapt it to the colossal dimensions of the proposed monument. The pope insisted on M. painting with his own hand the ceiling of the Sistine Chapel. M. was unwilling, declaring that painting was not his work; but he began 1508, and completed within less than two years his colossal task, which proved one of the most marvellous of his works. The subjects of these cartoons are from the book of Genesis, while between these and the representations of the persons of the Savior's genealogy are colossal figures of prophets and sibyls. These frescoes on the ceiling of the Sistine Chapel illustrate what is best and grandest in this great painter's art. M.'s genius was too often trammelled by the unworthy tasks in which Leo X. and successive popes engaged him, the pope having employed him for years in planning and superintending the excavation of roads for the transportation of marble from Carrara, and in other ignoble labors. The Florentines and Bolognese vied with the pontiffs in trying to secure his services; and to his skill as an engineer Florence was indebted for the plans of the fortifications by which she was enabled for a prolonged time to resist the attempts of the Medici to recover possession of the city after their expulsion from it. On the surrender of Florence, he returned to Rome, where his great picture of the *Last Judgment* was painted for the altar of the Sistine Chapel. This colossal fresco, nearly 70 ft. in height, completed 1541, was regarded by contemporary critics as having surpassed all his other works for the unparalleled powers of invention and the consummate knowledge of the human figure which it displayed. It is probably the most famous single picture ever painted by human hands. Devoid of beauty and tenderness, it developed to an extreme all that was terrible in the fierce and bitter theology of that age. The Sistine *ceiling* pictures are far more Christian. After its completion, M. applied himself to the perfecting of St. Peter's, which, by the touch of his genius, was converted from a mere Saracenic hall into the most superb model of a Christian church. He refused all remuneration for this labor, which he regarded as a service to the glory of God. M. died at Rome, but his remains were removed to Florence, and laid within the church of Santa Croce. His piety, benevolence, and liberality made him generally beloved; and in the history of art no name shines with a more unsullied lustre.—See Vasari's *Vite de' Pittori* (Eng. trans.), and Lives by Duppa (1806), Harford (1857), Wilson (1876), and H. Grimm (Hanover, 5th ed. 1879).

MICHELET, *mēsh-lā'*, JULES: brilliant French historian: 1798, Aug. 21—1874, Feb. 9; b. Paris; of Huguenot descent. He studied with great success under Villemain and Leclerc, and at the age of 23 became a prof. in the Collége Rollin, where he taught history, philosophy, and the classics. In 1826 he published *Les Tab*



MICHAEL ANGELO.

leaux Synchroniques de l'Histoire Moderne, and was named Master of Conferences (*Maître des Conférences*) at the *Ecole Normale*. After the revolution of 1830, he was chosen head of the historic section, intrusted with the care of the archives of the kingdom; was assistant to Guizot at the Sorbonne; and tutor to the Princess Clémentine, daughter of the French king; and published several valuable books—e.g., *Précis de l'Histoire Moderne* (1833, more than 20 editions), *Précis de l'Histoire de France jusqu'à la Révolution Française* (7th ed. 1842), *Mémoires de Luther* (1835), *Origines du Droit Française cherchées dans les Symboles et Formules du Droit Universel* (1837). In 1838 he succeeded Daunou in the Collége de France, and Comte Reinhard in the professorship of moral philosophy. He then plunged into controversy with all the vivacity and impetuosity of his nature. The Jesuits were the grand objects of his dislike; and eloquence, sarcasm, sentiment, and history all were brought to bear upon them with brilliant effect. Three books were the fruits of his polemic: *Des Jésuits*, in conjunction with Edgar Quinet (1843); *Du Prêtre, de la Femme, et de la Famille* (1844); *Du Peuple* (1846). In 1847 appeared vol. 1 of *Histoire de la Révolution;* and it was finished 1853, in 6 vols. When the affair of 1848 broke out, acting more wisely than most of his learned *confrères*, he declined to take active part in political struggles, and quietly pursued his literary avocations. He, however, lost his situation in the archives office after the *coup d'état*, by refusing to take the oath of allegiance to Louis Napoleon. He died at Hyères. Other works of M. were *L'Oiseau* (1856), *L'Insecte* (1857), *L'Amour* (1858) and *La Femme* (1859)—these two were severely and justly criticised; *La Mer* (1861), *La Sorcière* (1862), *La Bible de l'Humanité* (1864, of little value); and *Nos Fils* (1869), a plea for compulsory education. His masterpiece is his *Histoire de France*, finished 1867, now pub. in 19 vols. Its continuations, somewhat inferior, are *Histoire de la Révolution Française* and *Histoire du XIXme Siècle*. M. was brilliant, original, picturesque; but his work shows the bias of strong prejudices, political and theological; and though he was faithful and laborious in historical research, his prejudices, combined with his vivid imagination, have been thought to detract from trustworthiness while adding to brilliancy.

MICHIGAN, *mish'i-gan:* state: one of the United States, 13th in order of admission into the Union, and thus the 26th of the states, 9th in amount of pop. and wealth, 1st in manufacture of lumber, salt, and production of iron ore and copper, 4th in wheat and sheep, 8th in production of pig iron and steel; by census of 1900, 9th in wool clip, 10th in wheat, 4th buckwheat, 10th in oats, 13th in barley, and 18th in Indian corn: name from Indian words *mitchi* and *sawgyegan*, 'lake country.

Location and Area.—M. has a situation, in its two parts (commonly designated as its southern and northern peninsulas), peculiarly within the waters of the great lakes, lat. 41° 45′—48° 20′ n., long. 82° 25′—90° 34′ w.; bounded in its main part s. by Ind., e. by the w. end of Lake Erie, Detroit river, Lake St. Clair, St. Clair river, and Lake Huron; n. by the upper extremities of lakes Huron and Michigan, and w. by Lake M.; and in its northern part shut in by the waters of Lake Superior on the n., St. Mary's river e., lakes Huron and Michigan s. and s.e., with an extended s.w. boundary on the extreme n.e. part of Wis.: greatest length, n. to s., of main part, 277 m., extreme width 259 m.; length of northern part, e. to w., 318 m., width 30 to 164 m.—this part forming about two-fifths of the state; area of both parts 58,915 sq. m. (37,705,600 acres); elevation of main part 400 to 600 ft. above lake-level; of northern part 400 to 1,100 ft. above Lake Superior; coast-line along navigable lake waters over 1,600 m.; cap. Lansing, since 1847; early cap. Detroit, of terr. from 1805, of state 1835–47. The original terr. of M. organized (1835) as a state was the present s. part only; the n. part was added at admission of state (1837). See *History*.

Topography.—The two parts of the state present a striking contrast in nearly every respect. The s. and main part is generally level, but with a long slope upward from Lake Michigan to a water-shed, the line of which runs n. and s. in the e. part of the state; and with a short slope down to the shores of Lake Huron. The shores of the lakes, on both the e. and the w. sides, are bold, those on the w. especially, often forming bluffs and hills 100 to 300 ft. high; and in the s. occur a considerable number of conical hills, 50 to 200 ft. high. The n. part is in two sections, e. and w. of a line drawn n. and s. through Marquette. The e. section is a plateau which has a long slope upward from its s. border to a water-shed near its n. border, and thence falls rapidly to the shores of Lake Superior. There are many lakes and marshes on this plateau, and a general covering of fine forests, in large part pine and other soft woods, but frequently varied by groves of beech and sugar maple. The w. section of the northern part is rugged, and to a large extent hilly, some of the hills rising 1,000 or 1,200 ft. In the extreme n.w. are the ranges which form the richest copper region known, except Chili. The central range reaches from Keweenaw Point entirely across into Wis., and on either side it is flanked by the Porcupine

Area in Square Miles, 58,915 Population, 2,420 982

Number of Counties, 83 Capital of State, Lansing

MICHIGAN
Upper Part
Same Scale
MICHIGAN
Lower Part
SCALE OF MILES
0 10 20 30 40 50 60
SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ERIE
LANSING
Grand Rapids
Battle Creek
Ann Arbor
Jackson
Saginaw
Bay City
Muskegon
Milwaukee
Chicago
Detroit
Toledo
Port Huron
Sault Ste Marie
Marquette
Escanaba
Menominee
Manistee
Traverse City
Alpena
Petoskey
Mackinaw
Sandusky
Sheboygan
Racine
Waukegan
Benton Har.
St. Joseph
Michigan City
Bay City
Saginaw
Muskegon
Grand Haven
Holland
Saugatuck
Ludington
Pentwater
Mears
Whitehall
Ferrysburg
N. Olive
Beaverton
Alpena
Harbor Sprs.
Petoskey
Charlevoix
Cheboygan
Mackinaw
Sault Ste Marie
Escanaba
Menominee
Marquette
Ironwood
Houghton
Hancock
Calumet
Red Jacket
Copper Fall Mine
Eagle Harbor
Eagle River
Pangassin
Searchmond
Grand Marais
Soo Jc.
Sault Ste Marie
Detour
Bois Blanc
Freedom
Hoffman
Rogers
Hawkes
McPhee
May Lake
Valentine Lake
Boyne Falls
Petoskey
Harbor Sprs.
Charlevoix
Thumb Lake
South Arm
Kegonic
Trow
Bridge
Alanson
Indian River
Pellston
Brutus
Cut Head Bay
Leland
Bellaire
Gaylord
Atlanta
Port Oneida
Elk Rapids
Alba
Bear Lake
Idlewild
Lewiston
Ossineke
Blackriver
Frankfort
Watervale
Arcadia
Manistee
Ludington
Pentwater
Sheboygan
Milwaukee
Racine
Waukegan
Chicago
Michigan City
Benton Har.
St. Joseph
Muskegon
Grand Haven
Holland
Saugatuck
Grand Rapids
Battle Creek
Ann Arbor
Jackson
Saginaw
Bay City
Port Huron
Detroit
Toledo
Monroe
Erie
Alexis Jc.
Sandusky
Port Austin
Eagle Bay
Harbor Beach
Bad Axe
Ruth
Pigeon
Ubly
Palm
Downington
Carsonville
Croswell
Greenwood
Blaine
Marlette
Clifford
Lapeer
Imlay City
Almont
Romeo
Richmond
Sarnia
St. Clair
Lexington
Mt. Clemens
Birmingham
Pontiac
Milford
Wixom
Novi
Northville
Plymouth
Ypsilanti
Milan
Dundee
Tecumseh
Adrian
Hillsdale
Jonesville
Coldwater
Sturgis
Kalamazoo
Allegan
Holland
Saugatuck
Grand Haven
Muskegon
Ludington
Manistee
Traverse City
Petoskey
Alpena
Harbor Sprs.

mt. range and the s. copper range. These ranges are well clothed with timber, mostly sugar maple, with very little pine or other soft wood. By the side of the s. copper range lies the iron range of Marquette co. The soil of the northern part of M. is generally sterile; but in the southern and main part, the depth of loam, often mixed with gravel or clay, secures lands of remarkable fertility. The number of lakes and lakelets scattered through all parts of M. is over 5,000, covering 712,864 acres. The rivers are mostly small, but their number is so great as to abundantly water all parts of the state. The Saginaw, Grand, St. Joseph, and some others are to a small extent navigable. The rivers which flow into Lake M. are the St. Joseph, Kalamazoo, Grand, Muskegon, Manistee, Grand Traverse, Manistique, and Escanaba; into Lake Erie, the Huron and Raisin; into Lake Huron, the Saginaw, Au Sable, Thunder Bay, Cheboygan; into Lake Superior, the Ontonagon and Tequamenon. There are groups of islands in the various lake waters—e.g., the Manitou, Fox, and Beaver, in Lake M.; the Bois Blanc, Mackinaw, and Marquette, in the n. part of Lake Huron; Sugar and Nebish islands, in St. Mary's river, and Drummond's Island at its mouth; Grand Island and Isle Royale, in Lake Superior. Isle Royale, with a large number of rocky islets clustered about it, forms an important part of Keweenaw co., 55 m. n.w. from Keweenaw Point, and within 15 m. of the Canada shore: length n.e. to s.w. 45 m.; greatest width 9 m.; area 225 sq. m. It is well clothed with timber, and rises, at points of a central ridge, to 700 ft. The rich copper range of the mainland occurs in it, and there are many relics of ancient mining, such as stone hammers weighing 10 to 30 lbs.; copper knives and other tools which have been hardened by fire; excavations extending continuously more than two m.; underground drains, one of which was cut 60 ft. through rock and covered with large timbers; and many other evidences of skill in mining, following the deposits of sheet-like copper, and making no account of nuggets. On the s. side, where a stream 40 ft. wide has cut a passage through the shore rocks, there are indications of an ancient town, on an elevated slope overlooking the lake, but no human remains. Copper arrowheads have been found on this island, and a rude wooden bowl 3 ft. in diameter. Since the ancient mines were abandoned, at least one generation of the immense trees of the natural forest has grown over them. In all parts of M. lakes are numerous, varying in area from a few acres to several sq. m. The marginal waters of the great lakes contiguous to M. afford navigation for the largest ships and steamers. Navigation around the falls of the St. Mary's, giving passage from Lake Superior to Lake Huron, is effected by means of the St. Mary's ship-canal, at Sault Ste. Marie, originally opened 1855, with two locks, each 70 ft. wide and 350 ft. long between gates, and canal one m. long, giving passage to vessels drawing not over 11½ ft.; the whole improvement

costing $999,802. The St. Mary's river, connecting lakes Superior and Huron by a water-way 75 m. long, is properly a series of lakes linked together by narrow and crooked channels. The fall, through the first 50 m. from Lake Superior, is 20.5 ft., and practically it begins 15 m. from Lake Superior, at the falls of St. Mary, where 18 ft. of descent occur in about one m., while for the 35 m. beyond 2.3 ft. of fall occur. The earliest improvement by canal and locks, 1852–55, was provided for by a congressional grant of 750,000 acres of land, and the tonnage through the canal which followed was 100,000 tons the first year, 400,000 five years later, 700,000 ten years later, 1,260,000 in 1875, and 1,750,000 in 1880, at which time the pig-iron production of the United States was drawing one-third of its total supply of ore through this channel, from the Lake Superior mines. Before 1880 the pressure of shipping showed the necessity of a further construction, and the second canal was executed, one of the most important and remarkable engineering works of the time, having a length of 515 ft., width 80 ft., and depth of water over the mitre sill 17 ft. This was opened for business 1881, Sep. 1; and meanwhile extensive improvements were made in the canal above the new lock, and at points in the channel below, and a depth of water obtained nearly equal to that of the lock. The cost of the second work was $2,000,000, and its value in saving cost of iron-ore transportation was $800,000 the first year. To complete needed communication, congress 1881, Dec. 29, called on the war dept. for a report as to additional works, and 1882, Jan. 14, Gen. Godfrey Weizel made this, recommending the immediate construction of another lock, the improvement of Hay Lake channel, and the making of a dry-dock on the canal, at an estimated cost of $4,738,865 for the lock and canal, and $2,659,115 for Hay Lake channel. The new lock was constructed on the site of that of 1855, 800 ft. long, 100 ft. wide, with 21 ft. of water over the mitre sill. Hydraulic machinery operates the gates and valves of the locks, and a movable dam has been constructed for stopping the flow of water through the canal or locks whenever required by any accident to the locks or the banks below.

Climate.—In a state covering so wide a range of latitude, climatic conditions necessarily show large variations. The mean annual temperature varies from 40.4° in the Upper Peninsula to 46.9° in the southern part of the Lower Peninsula. The mean average temperature in July and August is 64.2° in the first named region, and 71.6° in the latter. In January and February, the mean average varies from 14.3° to 23.5°. The annual rainfall averages 28 inches. Owing to the proximity of the lakes, the climate of the southern peninsula is milder in winter and cooler in summer than in other parts of the country in the same latitude.

In the northern part of the Lower Peninsula many attractive summer resorts have developed along the lake coast. At other places popular resorts have built up on account of the medicinal value of mineral springs, chief among these being Mount Clemens; while the waters of four mineral springs find a market.

Rivers and Lakes.—Along the lake coasts are numerous bays and inlets. Keweenaw, White Fish and the Big and Little Noquette bays are the principal indentations on the north; while the Grand and Little Traverse, Thunder and Saginaw bays indent the southern peninsula. The rivers are small, short and shallow. The most important are the Grand, flowing into Lake Michigan; and the Saginaw, flowing into Lake Huron; each of which is navigable for about forty miles. Among the other rivers may be mentioned the Au Sable, Thunder Bay, and Cheboygan, flowing into Lake Huron; Ontonagon and Tequamenon into Lake Superior; and the St. Joseph, Kalamazoo, and Escanaba into Lake Michigan. Lakes abound throughout the state, over 5,000 in all, and no less than 175 are in the basin of the Kalamazoo river. These lakes are valuable sources of water supply, which is abundant throughout the state. The largest lakes are Houghton, Mullets, and Burts, in the northern part of the Lower Peninsula; and Manistique in the Upper Peninsula.

Geology.—The geology of the state represents every series known from the oldest strata to the carboniferous. Primary boulders are found over the entire surface, the northern part being principally of primitive origin, while Secondary deposits cover the entire southern peninsula. The Upper Peninsula exhibits Lower Silurian sandstones, limestones, copper and iron bearing rocks, corresponding to the Huronian system of Canada. The Mineral Range of Mountains is of eruptive or volcanic rock, with older strata tilted upon its side. Farther eastward are the long belts of the Lower Silurian, curving from Green Bay through the St. Mary's Peninsula. The central portion of the southern peninsula contains coal measures and rocks of the permo-Carboniferous period. The coal-bearing area of about 5,000 square miles is in the neighborhood of Saginaw; but the coal is for the most part of inferior quality. The surface of the state is largely determined by glacial action, being covered with a sheet of till, in some places some hundreds of feet in thickness. The rivers are upon the drift surface.

Minerals.—Michigan possesses vast mineral wealth, especially in the copper and iron mines of the Upper Peninsula. The Calumet and Hecla and other famous copper mines are on Keweenaw peninsula; and furnish copper of a quality nowhere surpassed, and for some purposes unequaled. Until recently Michigan had the largest output of copper of any state, and still holds second rank, the product of 1901 being 69,772 tons.

In iron ore Michigan was also first among the states, until within a few years, when Minnesota has taken first place by a small margin. In 1901 the Michigan output was 9,654,067 tons, valued at $21,735,592. Some gold is found in the Upper Peninsula, and silver and lead in small amounts. In the Lower Peninsula the most important mineral product is salt, found in large quantities in the Saginaw Valley. The output for 1901 was 7,729,641 barrels from 254 wells, valued at $2,437,677, the largest amount from any state and one-third of the total for the United States. In the same region (Bay and Saginaw counties) coal mining has been developed on a considerable scale, mainly since 1898. In 1901 the output was 1,241,241 short tons, valued at $1,753,064. Brick, tile and other clay products are made easily and cheaply in many parts of the state, the total value of such products for 1901 being $1,542,034. Within recent years the manufacture of Portland cement has been developed on a large scale; and in 1901 there were ten works with a total product of 1,025,718 barrels, valued at $1,128,290. Building stone is found in many parts of the state; and in the Upper Peninsula this includes marbles and other ornamental stone, such as agates, jasper, chalcedony, and chlorastrolites. As yet, however, a comparatively small amount is marketed. Large deposits of gypsum are found in the Lower Peninsula near Grand Rapids. Glass sand is found in the extreme southeast of the state; on the shores of Lake Huron grindstones are quarried; while still other minerals exist in less important quantities in various parts of the state.

Forests.—One of the most important sources of wealth and material prosperity to Michigan has been its abundant forests. Originally the Upper Peninsula and the northern half of the Lower Peninsula were covered with dense forests of conifers, consisting mainly of white pine. Farther south, hard woods were intermingled in larger proportion; while the southern part was mostly prairie. Besides white pine, the principal trees include basswood, maple, elm, sassafras, butternut, walnut, poplar, hickory, oak, willow, birch, beech, hemlock, witch-hazel, tamarack, cedar, locust, dogwood, and ash. The total forest area of the state, including stump land, is estimated at 38,000 sq. m. of two-thirds of the total area. Until after 1860 the production of lumber was relatively small; but by 1870 Michigan had gained first place as a lumber state, and maintained that position until 1900, when owing to the partial exhaustion of her resources she fell slightly behind Wisconsin. Michigan is, however, still the second state in lumber production.

In 1900, the total cut of lumber was 3,462,152,000 feet. The standing merchantable timber owned by lumber establishments was estimated to be 14,546,100,000 feet, which represents probably half the timber then remaining in the state. The lumber products have also

been of great service in developing other industries in the state, notably the manufacture of furniture, which centres at Grand Rapids.

Agriculture.—This is the chief industry in Michigan. One-third of the industrial population is engaged in agricultural pursuits; and the value of farm property is more than double the capital of manufacturing establishments, and nearly one-half of the total assessed valuation of all property in the state.

In 1900 the farm lands amounted to 47 per cent of the total area; and of this acreage 68 per cent was improved land. Most of the farming is in the Lower Peninsula. More than four-fifths of the farms are cultivated by the owners; less than five per cent are operated by cash tenants, and but 11 per cent by share tenants. Cereals constitute the most important farm crops, contributing 45 per cent of the total value of crops in 1899. Corn is the leading crop, wheat ranks next in value, and oats third. Hay and forage yield nearly one-fourth of the total value of farm crops. Vegetables are raised in large quantities and the state leads in the production of beans, peas, celery, chicory, and peppermint; is fourth in potatoes, and second in sugar beets. Fruit raising is a rapidly growing industry, especially in the southwestern part of the state, on the shores of Lake Michigan. Apples and peaches are the principal orchard products; but there are also large quantities of pears and plums, as well as a considerable amount of grapes. In small fruits, Michigan ranks second among the states for its crop of strawberries, blackberries, currants, and raspberries.

Live Stock.—The live stock interests are extensive and steadily increasing. Horses and dairy cows are the most important animals; and there are large numbers of other neat cattle, sheep and swine. The production of milk for 1899 was exceeded only by New York, Pennsylvania, and Ohio; and the state also stands high in the output of butter and eggs. In the production of wool, Michigan ranks second only to Ohio among the states east of the Mississippi.

Manufactures.—While Michigan is not one of the most important states in the extent of its manufacturing industries, there has been a large growth in this direction during the last half century, and the state ranks tenth in the Union in the value of its manufactured products.

The industrial development of the state has been marked by a steady diversification of its manufactures. The earliest, and for some time the only, industry of importance was the manufacture of lumber and timber products; and this still remains the leading manufacturing industry. With the decline of lumbering there has been some falling off in the value of crude lumber products; but the more intricate and specialized industries continue to develop. In particular the manufacture of furniture shows a large increase during the last

decade; and Michigan ranks third among the states in this branch, as it does also in planing mill products. Second in importance among the groups of industries are those manufacturing food and kindred products, flour and grist mill products forming the principal branch of this group. Two minor food industries have received especial attention; the state ranks second in the production of beet sugar; and cereal and breakfast foods are manufactured in large quantities. Other industries of importance are iron and steel, other metals, car shops, chemicals, and leather products.

In 1905 there were 7,446 manufacturing establishments in the state, capitalized at $337,894,102, employing on the average 175,229 wage-earners, whose wages aggregated $81,278,837, using materials valued at $232,516,583, and turning out finished products valued at $429,039,778. There were eight industries producing goods to the value of more than $10,000,000, as follows: Lumber and timber products, $40,569,335; foundry and machine shop products, $31,506,195; flour and grist mill products, $26,512,027; smelting and refining copper, $21,222,217; carriages and wagons, $20,097,704; furniture, $18,421,735; lumber, planing mill products, including sash, doors, and blinds, $14,375,467; and steam railroad cars, $13,467,751.

There has been a moderate localization of manufacturing in the southern half of the Lower Peninsula. Detroit, located conveniently for lake navigation at the point of union between the railroads of the United States and Canada, is the largest manufacturing centre in the state; and leads especially in the manufacture of stoves, pharmaceutical chemicals, and tobacco. Grand Rapids is conspicuous as one of the great furniture centres of the world. Battle Creek is noted for its breakfast foods. Shipbuilding is carried on at Port Huron, Detroit, and Wyandotte. At Belding there are important silk interests.

Commerce.—Michigan has four ports of entry, Detroit, Port Huron, Grand Haven, and Marquette; and its proximity to Canada would make these important centres of foreign trade under favorable conditions. But under existing tariff laws the volume of foreign commerce is comparatively small. For the year ending 1902, 30 June, the total exports from these Michigan ports were $27,038,375, and the total imports were $7,082,782. The internal and interstate commerce of the state is of vast and growing importance, especially the traffic on the Great Lakes. Lake commerce has been greatly promoted by improvements to navigation, and especially by the construction of ship canals at the falls of the St. Mary's river, across the shallows at the head of Lake St. Clair, and across the Keweenaw peninsula. The traffic through St. Mary's Falls canal in the year 1902 was 35,064,251 tons of freight, four times the volume of freight through the Suez canal. The most important items in this traffic were iron ore, 23,-

966,724 tons; grain, 96,160,313 bushels; flour, 8,469,085 barrels; and coal, 4,309,899 tons. Arrivals and clearances of vessels at Detroit in 1903 aggregated 4,534,000 tons.

Railroads.—The first railroads in Michigan were begun by the state government in 1836; but these lines were sold in 1846 to private companies. In 1904 there were 8,467.76 miles of railroad in the state, extending to nearly every one of the 83 counties. The leading lines are the Michigan Central, the Lake Shore & Michigan Southern, the Chicago & Grand Trunk, and the Pere Marquette. In 1904 there were 30 electric street railway companies in the state operating 1,203 miles of track. This includes local roads in most of the principal cities, and also interurban lines which have been extended rapidly within recent years. From Detroit it is possible to go by electric railway as far as Kalamazoo, Port Huron, or Bay City; while additional lines radiate from Grand Rapids and other cities.

Banking.—The first bank in Michigan was organized in Detroit in 1817. When the state was admitted to the Union in 1837 a period of wildcat banking ensued, which soon brought disaster. The state banks as well as the national banks are now on a sound basis. On 1906, Sept. 4, there were 300 state banks, 6 trust companies, and 1 savings society in operation in M., having combined resources of $231,329,561.26, and liabilities comprising capital stock $18,737,335.32, surplus fund $8,244,835.55, undivided profits, net, $3,982,885.93, commercial deposits subject to check $51,128,996.64, savings deposits of $97,156,667.59, etc. On the same date there were also 88 national banks, having combined resources of $129,393,245.36, capital stock $12,955,000, surplus fund $5,182,950, undivided profits $1,939,644.58, individual deposits of $86,994,111.21, etc. The exchanges at the different clearing-houses of the state for the year ending 1905, Sept. 30, were as follows: Ann Arbor $5,821,952, Detroit $575,309,586, Grand Rapids $105,655,846, Jackson $11,771,882, and Kalamazoo $41,463,978.

Government.—Michigan has 12 representatives in the lower house of Congress, and two senators. It forms part of the sixth federal judicial circuit; and is divided into two federal judicial districts and two internal revenue districts. There are 2,200 post-offices in the state, 8 of the first class. The state legislature consists of a Senate of 32 members and a House of Representatives of 100 members, the whole membership being elected biennially. The regular session of each legislature begins on the first Wednesday in January of odd-numbered years. The compensation of members is $3 per day and mileage. The governor is elected for a term of two years and receives a salary of $4,000 a year. Re-elections for a second term are frequent. Other state officers are elected for the same term; and various commissioners and members of boards are

appointed by the governor and senate. The supreme court consists of five justices, elected one every second year for ten years, at the spring election in April, when also are elected the regents of the State University. There are 38 state judicial circuits, each with one or more circuit judges, elected for a term of six years. County government is organized on the same plan as in New York, with a board of supervisors elected by townships and city wards. Sheriffs and other county officers are elected, in most instances, for a term of two years. Township organization is unimportant, owing to the large numbe. of villages and cities. There are 312 incorporated villages and 82 cities. Most of the latter are governed by special charters, with nothing approaching a uniform system of organization. Amendments to the constitution are adopted on passing each house of the legislature by a two-thirds vote, and afterward receiving a majority of the popular vote on the proposed amendment. Every 16 years the question of the general revision of the constitution is submitted to the electors. All male citizens of the United States who have resided in the state for six months, and in the ward or township for 20 days, are entitled to vote.

State Finances.—The first state legislature authorized a loan of $5,000,000 for public improvements; and in 1861 there was still $2,316,328 outstanding. During the Civil War this debt was increased to $3,880,399; but was steadily decreased and practically extinguished by 1890. In 1898, a loan of $500,000 was made on account of the war with Spain; but by 1903 this debt was reduced to $43,000. For the year ending 1906, July 1, the receipts were $16,154,218.98; balance, 1905, July 1, $4,007,299.58; total, $20,161,518.56; expenditures, $8,422,015.89; balance, 1906, July 1, $11,739,-502.67. The principal receipts were taxes on railroads, etc., $8,108,712.26; general taxes from county treasurers, $4,164,715.57, and interest $1,217,534.36. The appropriations during the year aggregated $2,316,-385.11, and the expenses of government $1,741,071.74.

Charities and Correction.—The state maintains five insane hospitals, at Kalamazoo (established 1848), Pontiac, Traverse City, Newberry, and Ionia, the last named for the criminal insane. In 1902 these institutions held property valued at $3,725,000, the number of patients was 4,630, and the annual expense $1-, 142,000. There is also a home for the feeble-minded and epileptic at Lapeer, and a soldiers' home at Grand Rapids. There is also a state school for the deaf and dumb at Flint, a school for the blind and an industrial school for boys at Lansing, an industrial home for girls at Adrian, and a school for neglected and dependent children at Coldwater, the last named the first of the kind in the United States. Correctional institutions consist of state prisons at Jackson and Marquette, and a reformatory at Ionia, with a total of 1,359 inmates in 1902. The expenditures for that year were $245,000,

and the receipts from prison industries $138,000. The indeterminate sentence has recently been adopted in Michigan. Each of these institutions is under the management of a separate board of unpaid trustees. An unsalaried State Board of Charities and Correction, appointed by the governor and senate, inspects both state and local institutions.

Education.—In 1901 there were 7,171 school districts, 16,504 teachers and 8,066 school buildings, the property aggregating $20,000,000. Out of 730,101 children between 5 and 20 years of age, 510,031 were enrolled in the schools. There were 261 public high schools and 445 private schools. The total public school revenue in 1901 was $8,890,000; and $4,736,779 was paid in salaries to teachers and superintendents. Only 4 per cent of the population is classed as illiterate. The state maintains four normal schools, and three institutions for higher education,—the University of Michigan (q. v.) at Ann Arbor, the Agricultural College at Lansing, and the College of Mines at Houghton. There are nine private colleges in the state, at Adrian, Albion, Alma, Battle Creek, Detroit, Hillsdale, Holland (Hope College), Kalamazoo, and Olivet. Besides the state library at Lansing and the University library at Ann Arbor, there are large public libraries in Detroit, Grand Rapids, and other cities. The newspaper press is well developed. The first was established at Detroit in 1817; and there are now over 800 newspapers and periodicals, of which 80 are issued daily, 600 weekly and 85 monthly.

Churches.—The Roman Catholic Church has the largest number of communicants. Of the Protestant denominations, the Methodist Episcopal Church is the first, and the Lutheran second; while the Baptist, Presbyterian, Congregational, and Protestant Episcopal follow in the order named; and the German Reformed, United Brethren, Disciples of Christ, and Adventists have also considerable numbers. In 1890 there were 4,798 church organizations, with 3,761 buildings and 569,504 members, and property valued at $18,682,971.

History.—French explorers first visited the site of Detroit 1610, and the falls of St. Mary 1641. Marquette made the first settlement at Sault Ste. Marie 1668; Fort Mackinac was settled 1671; and 1701 Detroit was founded, and, in presence of Indian chiefs of the northwest, formal possession was taken for Louis XIV. of all territory from the lakes to the South Sea, and a cedar post erected to mark the event. Wolfe's victory at Quebec 1759, Sept. 13-18, led to surrender of Detroit and other n.w. posts 1760. French rule finally yielded to British 1763, and Pontiac's conspiracy and exterminating war followed this change. Nominal American possession began 1783, at the close of the Revolution, but was not actual until 1796, when Detroit was first occupied by an American force, M. having been from 1787 part of the n.w. terr., of which Gen. St. Clair was the first gov. From 1802 it was a part of Indiana

terr. (cap. at Vincennes); 1805 the terr. of M. was created, with Hull as gov., who, as American commander in the war of 1812, surrendered it to British control 1812, Aug. 16. Col. McArthur recovered possession 1813, Sept. 29, and Col. Lewis Cass was made gov. for a period of extraordinary service, 1813-31, in dealing with Indians, securing surveys, opening roads, and preparing the foundations of a state. Govt. surveyors to locate bounty lands for soldiers in the war of 1812 reported against M. lands as swampy and sterile, and turned immigration away. In 1817 Chippewas and Wyandottes ceded 4,000,000 acres of what is now in n. O. and Ind. and s. M., giving M. settlements their first connection with those of O. and Ind. On the admission of Ill. into the Union, 1818, all the terr. lying n. of that state and Ind. was annexed to the terr. of M., and 1819 congress authorized this enlarged terr. to elect one delegate to Washington, with the right to speak, but not to vote. The Chippewas, 1819, ceded by treaty of Saginaw 6,000 acres of land; 1821, by treaty of Chicago, Chippewa, Ottawa, and Pottawattamie tribes ceded the land next w. of the Saginaw cession and s. of Grand river, and 1823 the Delawares gave up all that in the valley of the Muskingum. 1820, May 6, Cass and Schoolcraft set off at head of an exploring party, which made a journey of 5,000 m. in the n. w., as far as upper Red Cedar Lake. In 1823 Congress gave M. terr. the privilege of a legislative council of 9 appointed by the pres. out of 18 elected by the people; 1834 a census showed a pop. (87,278) entitled to form a state; 1835, Jan., legislative council authorized a convention to form a constitution; this body was elected Apr., and met at Detroit May; and Oct. the constitution was adopted, and state officers and legislature elected. Congress refused application for admission into the Union, except on conditions which a convention in M., 1836, Sept. 2, refused to submit to, a dispute existing as to the right of M. to extend to a line drawn due e. from the s. point of Lake M., and congress asking M. to yield the Toledo strip n. of this line, and take instead of it the present Upper Peninsula. A self-originated Jackson party convention assumed to accept this 1836, Dec. 6, and congress recognized this action and admitted the state 1837, Jan. 26, on the same day as Arkansas. A new constitution in 1850 was the final basis on which has been erected during 40 years one of the most remarkable of the great examples of state growth ever known. In the war of 1860–64, with a pop., 1864, of 805,379, M. had sent 90,747 men to the field, and the state, counties, cities, and towns had paid for war purposes $16,548,993, besides both state and private benefactions to disabled soldiers.

The state had prohibited the sale of liquor in 1855; but in 1876 the prohibition law was repealed, and a license tax substituted, which has since been raised to a high figure. In 1881 the United States ship canal

around St. Mary's Falls was completed, paving the way for the rapid development of the mining resources of the Upper Peninsula. In 1889 the Australian ballot was adopted. The question of a general revision of the State constitution was voted on in 1892, and again in 1898; but on both occasions failed to secure the required vote. Many amendments to the constitution have, however, been adopted from time to time. In recent years the most important legislation has been that dealing with taxation, especially of corporations. In politics Michigan was Democratic with the exception of two elections until 1854; and it has been Republican since, with but three exceptions—in 1882 and 1883 fusion Democratic-Greenback tickets, and in 1890 the Democratic party was successful. Among the leading Michigan men in public life may be noted:—Lewis Cass, who after his long service as governor of the territory, filled positions in the cabinets of two Presidents, was senator for two terms (1845–57) and a candidate for President of the United States; Zachariah Chandler, senator for three terms (1857–75), and secretary of the interior; James V. Campbell, justice of the Supreme Court from 1858 until his death in 1890; and Thomas M. Cooley, justice of the Supreme Court from 1864 to 1885, and chairman of the Interstate Commerce Commission. The state has voted for pres. and vice-pres.: 1837, Martin Van Buren and Richard M. Johnson, 3; 1840, William Henry Harrison and John Tyler; 1844, James K. Polk and George M. Dallas, 5; 1848, Lewis Cass and William O. Butler; 1852, Franklin Pierce and William R. King, 6; 1856, James Buchanan and John C. Breckinridge; 1860, Abraham Lincoln and Hannibal Hamlin; 1864, Abraham Lincoln and Andrew Johnson, 8; 1868, Ulysses S. Grant and Schuyler Colfax; 1872, Ulysses S. Grant and Henry Wilson, 11; 1876, Rutherford B. Hayes and William A. Wheeler; 1880, James A. Garfield and Chester A. Arthur; 1884, James G. Blaine and John A. Logan, 13; 1888, Benjamin Harrison and Levi P. Morton, 13; 1892, Grover Cleveland, 5, and Benjamin Harrison, 9, total 14; 1896, William McKinley and Garret A. Hobart, 14; 1900, William McKinley and Theodore Roosevelt; 1904 Theodore Roosevelt and C. W. Fairbanks; 1908, W. H. Taft and J. S. Sherman.

Population.—In 1810 the population of Michigan was 4,762; (1830) 31,639; (1840) 212,267; (1850) 397,654; (1870) 1,184,059; (1890) 2,093,890; (1900) 2,420,982. The principal cities are Detroit, 285,704; Grand Rapids, 87,565; Saginaw, 42,345; Bay City, 27,628; Jackson, 25,180; Kalamazoo, 24,404; Muskegon, 20,818; Port Huron, 19,158; Battle Creek, 18,563; Lansing, 16,485; and Ann Arbor, 14,509. Other cities of importance are Manistee, Ishpeming, Flint, Menomonee, West Bay City, Sault Ste. Marie, and Marquette.

Bibliography.—Cooley, 'Michigan: A History of Governments' (1885); Farmer, 'The History of Detroit and Michigan' (1889); Lamman, 'History of Michi-

gan, Civil and Topographical' (1839); McLaughlin, 'History of Higher Education in Michigan' (1891); Sheldon, 'The Early History of Michigan' (1856).

MICH'IGAN, LAKE: one of the five great fresh-water lakes, the only one wholly in the United States: having Mich. on the n. and e., Wis. and Ill. on the w., and Ind. on the s.; 345 m. extreme length, 84 m. extreme breadth; average breadth 70 m.; 22,400 sq. m.; mean depth, 1,000 ft. It is of about the same area as Lake Huron, and surpassed only by Lake Superior. It is 578 ft. above sea-level, and has been found by accurate observations to have a lunar tidal wave of three inches. It is the outlet of numerous rivers, and is connected, near its s. extremity, by a canal, and sometimes by flooded rivers, with the Mississippi, which is believed to have been its ancient outlet. At its n.e. extremity it communicates with Lake Huron through the Straits of Mackinaw, 4 m. wide at the narrowest part. It has two large bays, Green Bay (100 m. long), and Grand Traverse Bay (30 m. long); the largest islands are Beaver Island, in the n. part (50 m. long) and Fox Islands, in the n.e. Its principal harbors are those of Chicago, Milwaukee, and Grand Haven. It forms, with the lower lakes and the St. Lawrence, a natural outlet for one of the richest grain-growing regions in the world.

MICHIGAN, UNIVERSITY OF: founded 1837, Mar. 18, at Ann Arbor, Washtenaw co., Mich., on land granted by congress, 1826, to the territory of Mich. It was opened for students 1842, Sep. 20. It is part of the state system of public instruction; its purpose being to complete the course of instruction begun in the public schools, by giving a liberal education in the sciences, arts, and literature. It is supported by the state, and open to students of both sexes free of charge, except a small matriculation fee, and $15 annually. While primarily intended for students from Mich., admission is granted to others, at a slight advance in the matriculation fee. The university has seven departments: literature, science, and the arts; engineering; medicine and surgery, organized 1850; law, organized 1859; school of pharmacy; the homeopathic medical college; and the college of dental surgery. Selected studies also may be pursued for any period not less than one term; while any graduate of the university, or of any other collegiate institution, may pursue a post-graduate course for advanced study in any department, whether for a second degree or not. The degrees conferred are, on the completion of the classical course, B.A.; of the scientific, B.S.; Latin and scientific, PH.B.; Greek and scientific, PH.B.; civil engineering, C.E.; mining engineering, M.E. Degrees are conferred also on the completion of the regular 2-years' course in law, in medicine, in analytical chemistry, and in pharmacy. The management of each department and school is vested in its own faculty; while all the faculties together, numbering about 50 pro-

fessors and assistants, exclusive of a considerable number of lecturers and assistants, constitute the university senate, which considers question of common interest to them all. The libraries of the university, accessible to the students, aggregate about 67,000 vols., divided among the university library, the medical, the law, the libraries of two literary societies, and that of the Y. M. C. A. connected with the institution. The astronomical observatory contains one of the largest and best meridian circles of its kind in the country; the collimators for the same; a sidereal clock, made by Tiede, of Berlin; the library of the observatory, and the smaller instruments, among which is a chronograph with Bond's isodynamic escapement, for recording observations by the electro-magnetic method. The building consists of a main part, with 2 wings, and a movable dome; in the dome is mounted a large refracting telescope, with object-glass 13 in. in diameter, by Henry Fitz, of New York. The observatory was the gift of the people of Detroit, and was opened 1854. The university museum is in a recently erected fire-proof building 127 ft. long by 47 ft. wide. The collections in the various cabinets are full and valuable, and are constantly increasing. The geological cabinet contains about 45,000 specimens, including a very valuable and complete series of lithological and paleontological specimens; the zoölogical has about 120,000 specimens, including a complete series of the birds that visit Mich., and nearly complete series of the mammals of the state, and of the reptiles found e. of the Rocky mts., besides full collections of mollusca, fishes, and radiata; the botanical has about 75,000 specimens, of which about 10,000 are specimens of the plants of the state, besides a rare collection of Alaskan flora. In the mineralogical cabinet, besides an excellent collection of the minerals of the state, there is also one of about 6,000 European specimens purchased from the late Baron Lederer. In the department of history and fine arts there are collections of casts of the most important ancient busts and statues; of foreign engravings and photographic views; historical medallions, and copies of modern statues, busts, and reliefs by the great masters. The archeological cabinet has an interesting collection of relics of Indian and South Pacific islanders' instruments and utensils of domestic use. The anatomical museum is well furnished, and together with the clinical lectures enjoyed by the students makes the medical department one of the most thoroughly equipped in the country. Besides the observatory and museum, there are on the university grounds, embracing 44½ acres, a central building called University Hall, for the department of literature, science, and art; several buildings for those of law and medicine; a chemical laboratory; and the residences of the president and professors. University Hall is 347 ft. front. 140 ft. deep in the centre, and 40 ft. on the wings. It is surmounted by a dome 140 ft. high from the ground. In the front

of the second story it has a handsome and well-arranged audience-room with seating capacity of 3,000. The proceeds from the sale of the original university lands constitute a fund of about $543,000, held in trust by the state, and drawing interest at the rate of 7 per cent. A board of regents has the control of the university. These are elected by the qualified voters of the state, and serve for a term of 8 years. Elections are held biennially for 2 regents, 2 retiring every 2 years. The president of the university is *ex officio* a member and president of the board of regents, by whom he is chosen for his office. Previous to 1852 the university had no president. Since then it has had four, including the present incumbent, James B. Angell, LL.D., who has held the office since 1871, though absent 1880–1, when he was U. S. minister to China and chairman of a special committee to negotiate a treaty with that country. In 1905–6 the univ. had 300 professors and instructors, 194,672 vols. in the libraries; scientific apparatus and library valued at $1,000,000; grounds and buildings val. at $1,500,000; total income about $800,000; students in all depts., 4,571, of whom 1,566 were in the collegiate department and 813 in the summer session.

MICHIGAN CITY: city in Laporte county, Ind., on Lake Michigan, and on the Chicago, I. & L., the Michigan C., and the Lake E. & W. railroads; about 40 miles east of Chicago. The place was visited frequently in the 18th century by missionaries, explorers, and traders, but the first permanent settlement was made in 1833. The incorporation was maue in 1837. It has excellent transportation facilities which contribute to its commercial and industrial growth. Its chief manufactures are hosiery, knit underwear, chairs, lumber, railroad cars, and furniture. It has a large trade in iron ore, salt, lumber, and farm products. It has the Northern Indiana State Prison, a United States life-saving station, and on the lake front a park. Its educational institutions are a high school, public and parish schools, and a public library. The city is governed under a charter of 1867, since amended, which provides for a mayor, elected biennially, and a common council. The administrative officials are elected by the council or appointed by the mayor subject to the approval of the council. The waterworks are owned and operated by the city. Pop. (1900) 14,850.

MICHIGAN COLLEGE OF MINES, at Houghton, in the State of Michigan, was founded in 1885 and opened in 1886. The school is located in the midst of the mining region of the state, thus giving the students exceptional opportunities for observation and study. Practical work in mine surveying and mining is carried on for five weeks, 45 hours each week. The first two weeks are devoted to surveying and mapping a mine in the 'copper country' or in the iron mining district; the last three weeks are given to the examination of mining

methods, and to making sketches of mines in the vicinity. The courses of study lead to the degrees of bachelor of science and engineer of mines. The school is well equipped with all necessary apparatus. The metallurgical and assay laboratory is a brick building; and the ore-dressing building, or stamp mill, is a wooden building.

MICHIGAN STATE AGRICULTURAL COLLEGE, chartered in 1855, and opened in 1857, situated at Lansing. It was the first institution for agricultural education established in the United States. The Michigan State constitution provided that 'The legislature shall as soon as practicable provide for the establishment of an agricultural school.' In 1850 the legislature petitioned congress for a grant of land for an agricultural college within the state, but no attention was paid to this petition. In 1855, however, the legislature appropriated land and money for such a college, and located it on a farm of 684 acres. From that time until 1862 the college was supported by state appropriations; and in that year received control of the Federal land grant. The courses offered in the college include the full four years' courses in agriculture, mechanical engineering, and domestic science, and short courses (varying from four to twelve weeks) in chemistry, beet sugar production, cheese making, dairy husbandry, creamery management, live-stock husbandry, and fruit culture; graduate work is also provided for. The college organizes Farmers' Institutes throughout the state, which are under the supervision of members of the faculty. The experiment station is also connected with the college, and receives a separate Federal appropriation of $15,000 annually. Women are admitted to all courses, but form a small proportion of the graduates. The farm consists of 684 acres, and the buildings are valued at over $440,000. The library contains 25,000 volumes. Students number over 800 and the faculty 60.

MICHILIMACK'INAC: see MACKINAW.

MICHIPICOTEN, *mĭsh-ĕ-pĕ-kō'tĕn:* a bay in the western part of the province of Ontario, in Canada. It is an arm of Lake Superior, on the northeast shore; about 100 miles north of Sault Ste. Marie. At the entrance to the bay is Michipicoten Island.

MICHOACAN, *mē-chō-â-kân',* or MECHOACAN, *mā-chō-â-kân':* one of the states of Mexico, extending from 18° to 21° n. lat. on the Pacific; 22,874 sq. m. It is bounded on the north by the states of Guanajuato and Jalisco, on the east by Mexico, on the south by Guerro and the Pacific, on the west by the Pacific, Colima and Jalisco. Area, 22,874 sq. m. (Two railroad lines cover the state.) The soil is fertile; the principal crops are sugar, tobacco, vanilla, wheat, rice and tropical fruits. A large portion of the territory is mountainous, and there are several volcanoes, of which Jorullo is most noted. The highest altitude in the state is about 17,000 feet. There are 11 lakes, the largest of which, Chapala, is about 60 miles long by 20 miles wide.

The principal rivers are the Lerma and the Mescala, but there are many mountain streams by which the valleys are abundantly watered. Buceria and Maratua are the sea-ports. The climate ranges from the extremes of heat on the coast to cold on the mountains, and except in parts of the low land is quite healthful. The products of the various mines of gold, silver, copper, lead, iron, etc., amount to over $1,000,000 per year, and lithographic stone and marble are quarried in considerable quantities. Domestic animals are reared in large numbers, and fish abound in the lakes and rivers. Among the manufactures are shawls, blankets, and silver-ware. Coffee, indigo, silk, and various dye-woods are exported. The cap. is Morelia. There are a large number of schools and a state college. Pop. (1900) 935,849.

MICIP'SA: see JUGURTHA.

MICKLE, a. *mĭk'l* [AS. *micel;* Icel. *mikill;* Goth. *mikils;* Scot. *meikle* or *muckle*, much, great]: in *OE.*, much; great.

MICO, n. *mī'kō* [Sp. *mico*]: a small S. Amer. monkey.

MICRASTER, n. *mī-krăs'tĕr* [Gr. *mikros*, small; *astron*, a star]: in *geol.*, a genus of sea-urchins abounding in the Chalk, and so termed from the star-like arrangement of its small or incomplete ambulacral furrows.

MICRO, *mī'kro* [Gr. *mikros*, small]: a prefix in scientific words signifying 'smallness': among electricians, and on the C. G. S. system, division by a million.

MICROBES, n. plu. *mī'krōbz* [Gr. *mikros*, small; *bios*, life]: minute organisms found in the blood of animals suffering from splenic fever, as its producing cause; a general term for any very minute organisms of the nature of Bacteria, comprising micrococcus, etc.: see BACTERIUM: GERM THEORY: KOCH, ROBERT: PASTEUR, LOUIS.

MICROCEPHALOUS, a. *mī'krō-sĕf'ă-lŭs* [Gr. *mikros*, small; *kephălē*, head]: having a small or imperfectly developed head or cranium. MICROCEPHAL'IC, a. *-sē-făl'ĭk*, term applied to skulls having a capacity below 1,350 cubic centimetres.

MICROCHRONOM'ETER: see MICRONOMETER.

MICROCOCCUS, n. *mī'krō-kŏk'ŭs* [Gr. *mikros*, small; *kokkos*, a kernel]: any minute form or organism supposed to have life; a genus of the Bacteria, the basis of all yeast formations, and a source of fermentation.

MICROCOSM, n. *mī'krō-kŏzm* [Gr. *mikros*, small; *kosmos*, the world]: the little world, applied to man as the cosmos in miniature, or as supposed to be an epitome of the universe or great world, which was called the *macrocosm* (great world). MI'CROCOS'MIC, a. *-kŏz'mĭk*, or MI'CROCOS'MICAL, a. *-kŏz'mĭ-kăl*, pertaining to the microcosm.—The belief, current in ancient times, that the world or cosmos was animated, or had a soul (see ANIMA MUNDI), led to the notion that the parts and mem-

bers of organic beings must have their counterparts in the members of the cosmos. Thus, in a hymn ascribed to Orpheus, the sun and moon are as the eyes of the animating godhead, the earth and its mountains as his body, the ether is as his intellect, the sky as his wings. The natural philosophers of the 16th c.—Paracelsus at their head—took up this notion anew, modified it, and considered the world as a human organism on the large scale, and man as a world, or cosmos, in miniature. With this was associated the belief that the vital movements of the microcosm exactly correspond to those of the macrocosm, and represented them, as it were, in copy; and this led naturally to the further assumption that the movements of the stars must exercise an influence on the temperament and fortunes of men: see ASTROLOGY.

MICROCOS'MIC SALT: sodium ammonium hydrogen phosphate, which crystallizes with 4 equivalents of water, its formula being $Na.NH_4.\ H.PO_4+4Aq$. It is prepared by mixing a hot solution of 6 parts of phosphate of soda with a concentrated solution of 1 part of muriate of ammonia, when the M. S. crystallizes in large transparent prisms, while common salt remains in solution. On the application of heat, it first loses its water of crystallization, and then its oxide of ammonium and basic water, so that only metaphosphate of soda remains, which, from its ready fusibility into a colorless glass, is valuable as a flux in blow-pipe experiments: see BLOW-PIPE. This salt was obtained originally from decomposed urine, whence its name, alluding to man, the 'microcosmos.'

MICROCOUSTIC, a. *mī-krō-kow'stĭk* [prefix *micro.;* Eng. *acoustic*]: serving to increase small or indistinct sounds; of or pertaining to a microcoustic: N. an aural instrument for collecting sounds for the partially deaf; an auricle or speaking-trumpet.

MICROCRITH, n. *mī krō-krĭth* [prefix *micro-;* Eng. *crith*]: in *chem.*, the weight of an atom of hydrogen.

MICROFARAD, n. *mī-krō-făr'ăd* [prefix *micro-;* Eng. *farad*]: in *electro-magnetics*, the millionth part of a farad. The farad being too large for practical purposes, the M. is often used in its pdace.

MICROGEOLOGY, n. *mī-krō-jē-ŏl'ō-jĭ* [prefix *micro-;* Eng. *geology*]: department of the science of geology whose facts are ascertained by the use of the microscope.

MICROGONIDIUM, n. *mī-krō-gō-nĭd'ĭ-ŭm* [Gr. *mikros*, small; *gonos*, offspring, seed; *eidos*, resemblance]: in *Algæ*, a single small zoöspore found in a germinating cell, formed at the expense of the contained plastic materials.

MICROGRAPH, n. *mī'krō-grăf* [Gr. *mikros*, small, *graphō*, I write, I draw]: instrument for executing extremely minute writing and engraving; its general principle is that of the pantograph.

MICROGRAPHY, n. *mī-krŏg'ră-fĭ* [Gr. *mikros*, small; *graphō*, I describe]: a description of microscopical objects. MICROGRAPHIC, a. *mī'krō-grăf'ĭk*, relating to micrography.

MICROLESTES, n. *mī'krō-lĕs'tēz* [Gr. *mikros*, small; *lēstēs*, a robber]: in *geol.*, a small fossil insectivorous quadruped.

MICROLITE, n. *mī'krō-līt* [Gr. *mikros*, small; *lithos*, a stone]: mineral occurring in exceedingly small octahedral crystals, hence the name. It has lately been found in well-defined crystals up to an inch and a half in diameter, and larger imperfect ones up to four lbs. in weight. Crystallization, isometric; lustre, resinous; color, wax-yellow to brown; streak, pale ocherous yellow; fracture, conchoidal, brittle: it is found with albite, etc., at Chesterfield, Mass., Utö, Sweden, and at the mica mines, Amelia co., Virginia.

MICROLITH, n. *mī'krō-lĭth* [prefix *micro-;* Gr. *lithos*, a stone]: term used in various significations; e.g., as equivalent to *crystallite*, i.e., an aggregation of globular microscopic forms; also as applied to minute forms shaped like a lath or an hour-glass. The latter is now probably the most frequent application of the term.

MICROLITHIC, a. *mī'krō-lĭth'ĭk* [Gr. *mikros*, small; *lithos*, a stone]: formed of small stones.

MICROMETER, n. *mī-krŏm'ĕ-tĕr* [Gr. *mikros*, small; *metron*, a measure]: instrument employed in measuring small objects, spaces, or very small angles formed by bodies at a remote distance. MI'CROMET'RICAL, a. *-mĕt'-rĭ-kăl*, pertaining to the micrometer. MICROM'ETRY, n. *-ĕ-trĭ*, the art of measuring minute objects or angular distances with a micrometer.—The *Micrometer* is of different forms, depending on different principles: these forms may be divided into two sections, according as they are applied to Physics or Astronomy. Of the former section are the Vernier (q.v.) and the Micrometer Screw, the latter instrument being merely a screw with a very regular thread, and a large round head, which is carefully graduated, generally to sixtieths, and furnished with an index. It is easily seen that if a complete turn of the screw advance its point $\frac{1}{20}$ of an inch, a turn sufficient to pass the index from one graduation to another will only advance it $\frac{1}{1200}$ of an inch, etc. This is the micrometer used in the construction and graduation of instruments. Of those applied to astronomical purposes, the most simple is a short tube, across the opening of which are stretched two parallel threads, or very fine wires, or spider-lines, which are moved to or from each other by screws. These threads are crossed

by a third perpendicularly, and the whole apparatus is placed in the focus of a lens. The distance of two stars is found by adjusting the two parallel threads, one to pass through the centre of each star, taking care that the threads are placed perpendicular to the line joining the stars, and finding how many turns and parts of a turn of the screw are required to bring the wires to coincide. The angle of position of two stars also is obtained by turning round the instrument till the third wire, which is normally horizontal, bisects both stars, and reading off on the circumference the arc passed over. *Fraunhofer's suspended annular micrometer* consists merely of a steel ring surrounded by a flat rim of glass, and the position of the star is deduced from the time when it crosses the ring and its path while within it. The Abbé Rochon substituted for the wire micrometer one made of two prisms of rock-crystal or Iceland spar, capable of double refraction.

MICROMETER SCREW: in optics, a screw attached to instruments for exact measurement of very small angles. The great space through which the lever of the screw passes, in comparison with the longitudinal motion due to the pitch, affords the means for a positive motion which is imperceptible on the object moved, though appreciable in its results.

MICRON, *mī'kron* [Gr. 'very small']: a unit of length equal to the millionth part of a metre, or the 25,400th part of an inch. It is much used among physicists in connection with precise measurements, and has been officially sanctioned by the International Commission of Weights and Measures. The Greek letter μ is used as its symbol. Thus '47 μ' is read 47 microns. The names 'bicron' and 'tricron' have been proposed, respectively, for the billionth and trillionth part of a metre, but they have not been generally adopted, and probably will not be. Etymologically, at least, they are monstrosities.

MICRONESIA, *mī-krō-nē'shĭ-a:* the name given to a large number of islands in the Pacific Ocean, the natives of which have a light skin as distinguished from Melanesia (q.v.), the inhabitants of which are dark-skinned. The islands extend southward from Japan to New Guinea, the chief groups comprising the Gilbert Islands, Marshall Islands, Carolines, Pelew Islands, and the Ladrones (q.v.).

MICRONOMETER, n. *mī-krō-nŏm'ē-tẹr* [a contraction of *microchronometer*]: kind of watch intended for measuring short intervals of time, e.g., the flight of a projectile, etc. After being wound up in the ordinary way, it is set in motion by pressing a spring with the finger, upon withdrawing which it is instantaneously stopped.

MICROPHONE, n. *mī'krō-fōn* [Gr. *mīkros*, small; *phonē*, a sound]: an electrical instr. for reproducing, and rendering with vastly increased and startling distinct-

ness, very minute and inaudible sounds—e.g., the tick of a watch or the tread of a fly—at almost any distance from its original source, in connection with the telephone. The principle of this instrument was discovered by Prof. David E. Hughes, an American resident in London, who announced the discovery in a paper delivered before the Royal Society, London, in 1878. The microphone, as the name implies, largely amplifies sounds. It consists of a vertical carbon pencil pivoted loosely at both ends in solid carbon receptacles which are fastened to a thin sounding-board, which board is suitably upheld by one edge on a solid block or base. When the carbon pencil is made part of an electric circuit in which are also a small battery and a telephone receiver, sounds are many times amplified; even a small cotton ball dropped on the block is heard in the telephone like a bullet falling on the floor. A number of theories have been advanced to explain the action of the microphone; one, adopted by the courts in this country in a case in which the validity of the Berliner telephone transmitter was an issue, being that the action is due to the remarkable effect of sonorous vibrations in varying the electrical resistance at a loose contact between solid electrodes. The most common form of carbon telephone transmitters in use today are varieties of the microphone. It may be added that Prof. Hughes gave this instrument to the world gratis. The principle of the microphone has also been utilized in a stethoscope. MICROPHON'ICS, n. *-ĭks*, the science or art of augmenting weak or small sounds.

MICROPHOTOGRAPHY, n. *mī-krō-fō-tŏg'ra-fĭ* [prefix *micro-;* Eng. *photography*]: photographic process by which an object is reduced in size, while its exact form is retained. By means of this instrument letters can be reduced to a minute space, and afterward either enlarged by photography or read with a microscope. Practical use of the process was made during the siege of Paris in 1870, in order to communicate with those inside that city by means of messages conveyed by carrier-pigeons, the transcript being taken on paper of extreme thinness, so that the pigeons were able to carry a considerable number of messages.

MICROPHYLLINE, n. *mī'krō-fĭl'lĭn* [Gr. *mikros,* small; *phullon,* a leaf]: a material composed of minute leaflets or scales.

MICROPHYTA, n. plu. *mī-krŏf'ĭ-tă*, or MICROPHYTES, n. plu. *mī'krō-fīts* [Gr. *mikros,* small; *phuton,* a plant]: in *geol.,* a term applied to minute forms of vegetable life; microscopic plants. MI'CROPHY'TAL, a. *-fī'tăl*, applied to deposits of minute forms of life, chiefly of vegetable origin.

MICROPYLE, n. *mī'krō-pīl* [Gr. *mikros,* small; *pulō,* a gate]: in *bot.,* the opening or foramen of the seed for the escape of the root of the embryo.

MICROSCOPE, n. *mī′krō-skōp* [Gr. *mikros*, small; *skopĕō*, I view]: instrument for viewing minute objects by magnifying them. MI′CROSCOP′IC, a. *-skŏp′ĭk*, or MI′CROSCOP′ICAL, a. *-ĭ-kăl*, very small; visible only by the aid of a microscope. MI′CROSCOP′ICALLY, ad. *-lĭ*. MICROSCOPIST, n. *mī-krŏs′kō-pĭst* or *mī′krō-skŏp′ĭst*, one who is skilled in the use of a microscope. MICROSCOPY, n. *mī-krŏs′kŏ-pĭ*, the use of the microscope; investigations with the microscope.

MI′CROSCOPE: instrument for use in examining objects so small as to be almost or quite undiscernible by the unaided eye. Its early history is obscure; but as it is quite evident the property of magnifying possessed by the lens must have been noticed as soon as it was made, we are quite safe in attributing its existence in its simplest form to a period considerably anterior to the time of Christ. It is generally believed that the first compound M. was made by Zacharias Jansen, a Dutchman, 1590, and was exhibited to James I. in London by his astronomer, Cornelius Drebbel, 1619. It was then very imperfect, coloring and distorting all objects. For many years, it was more a toy than a useful instrument, and it was not until the invention of the achromatic lens by Hall and Dollond, and its application to the M. by Lister and others, that it reached its present advanced position among scientific instruments.

An object to be magnified requires simply that it be brought nearer to the eye than when first examined; but as the focal distance of the eye ranges from 6 to 14 inches —10 inches being the average focal distance—it follows that a limit to the magnifying power of the eye is attained whenever the object to be examined is brought so near. If, however, we blacken a card and pierce a hole in it with a fine needle, and then examine a minute object, as, for instance, the wing of an insect held about an inch from the card, we shall see it distinctly, and that too, magnified about ten times its size. This is explained by the fact that the pin-hole limits the divergence of the pencil of rays, so that the eye can converge it sufficiently on the retina to produce a distinct impression, which is faint; and did not the blackened card exclude all other light, it would be lost. If we now remove the blackened card without either removing our eye or the object under examination, it will be found that the insect's wing is almost invisible, the unassisted eye being unable to see clearly an object so near as one inch; thus demonstrating the blackened card with the needle-hole in it to be as decided a magnifying instrument as any set of lenses.

By the apparent size of an object is understood the angle formed by two lines drawn from the centre of the eye to the extremities of the object, which is larger when the object is nearer the eye than when further removed. This angle is called the angle of vision, and is quite distinct from the angle of the pencil of light, by which the object is seen. The focal length of a lens determines its

magnifying power. The object to be examined is placed in its focus, so that the light which diverges from each point may, after refraction by the lens, proceed to the eye in lines as nearly parallel as is necessary for distinct vision. Thus, in fig. 1, AB is a double convex lens, in the

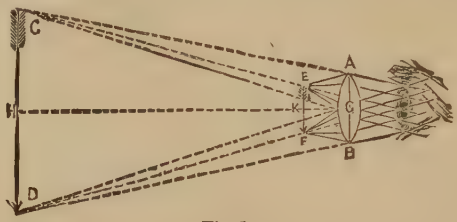


Fig. 1.

focus of which we have drawn an arrow, EF, to represent the object under inspection. The cones drawn from its extremities are portions of the rays of light diverging from these points and falling on the lens. These rays, if not interrupted in their course by the lens AB, would be too divergent to permit their being brought to a focus upon the retina by the lenses which constitute the eye. But as they are first passed through the lens AB, they are bent into nearly parallel lines, or into lines diverging from some points within the limits of distinct vision, as from CD. Thus bent, these rays are received by the eye as if proceeding from the larger arrow CD, which we may suppose to be ten inches from the eye, and then the ratio of the length of the virtual image to that of the real arrow (nearly 10 to 1) gives the magnifying power of the lens in question. The ratio of CD to EF is the same as that of HG to KG. Now, HG is the distance of distinct vision, and KG the focal length of the lens, so that the magnifying power of a lens is obtained by dividing the distance of distinct vision (ten inches for most individuals) by its focal length. Thus, if the focal length of a lens be $\frac{1}{4}$ inch, the magnifying power is $\frac{10}{\frac{1}{4}} = 40$. This supposes that the distance between the eye and the lens is so small as not materially to interfere with the correctness of this statement.

We have supposed the whole of the light to enter the eye through the lens AB (fig. 1), but it must now be stated that so large a pencil of light passing through a single lens would be so distorted by its spherical figure, and by the chromatic dispersion of the glass, as to produce a very indistinct and imperfect image. This is so far rectified by applying a stop to the lens, so as to allow only the central portion of the pencil to pass. But while such a limited pencil would represent correctly the form and color of the object, so small a pencil of light is unable to bear diffusion over the magnified picture, and is therefore incapable of displaying those organic markings on

animals or plants which are often of so much importance in distinguishing one class of objects from another. Dr. Wollaston was the first to overcome this difficulty, which he achieved by constructing a doublet (fig. 2), which consists of two plano-convex lenses, having their focal lengths in the proportion of 1 to 3, and placed at a distance best ascertained by experiment. Their plane sides are placed toward the object, and the lens of shortest focal length next the object. By this arrangement, the distortion caused by the first lens is corrected by the second, and a well-defined and illuminated image is seen. Dr. Wollaston's doublet was further improved by Mr. Holland, who substituted two lenses for the first in Dr. Wollaston's doublet, and retained the stop between them and the third. This combination, though generally called a triplet, is virtually a doublet, inasmuch as the two lenses accomplish only what the anterior lens did in Dr. Wollaston's doublet, though with less precision. In this combination (fig. 3) of lenses, the errors are still further reduced by the close approximation of the lenses to the object, which causes the refractions to take place near the axis; and thus we have a still larger pencil of light transmitted, and have also a more distinct and vivid image presented to the eye.

Fig. 2.

Fig. 3.

Simple Microscope.—By this term is meant an instrument by means of which we view the object through the lens directly. These instruments may be divided into two classes—those simply used in the hand, and those provided with a stand or frame, so arranged as to be capable of being adjusted by means of a screw to its exact focal distance, and of being moved over different parts of the object. The single lenses used may be either a double convex or a plano-convex. When a higher power is wanted, a doublet, as above described, may be employed, or a Coddington lens, which consists (fig. 4) of a sphere in which a groove is cut and filled up with opaque matter. This is perhaps the most convenient hand lens, as it matters little, from its spherical form, in what position it is held. In the simple M., single or combined lenses may be employed, varying from a quarter to two inches. There are many different kinds of stands for simple microscopes made, but as they are used principally for dissection, the most important point next to good glasses is to secure a firm large stage for supporting the objects under examination. When low powers alone are used, the stage-movements may be dispensed with; but when the doublet or triplet is employed, some more delicate adjustment than that of the hand is necessary.

Fig. 4.

Compound Microscope.—In the compound M. the observer does not view the object directly, but an inverted image or picture of the object is formed by one lens or

set of lenses, and that image is seen through another lens. The compound M. consists of two lenses, an object and an eye lens; but each of these may be compounded of several lenses playing the part of one, as in the simple M. The eye-lens is that placed next the eye, and the object-lens that next the object. The former is called also the ocular, and the latter the objective. The object-glass is generally made of two or three achromatic lenses, while the eye-piece generally consists of two plano-convex lenses, with their flat faces next the eye, and separated at half the sums of their focal lengths, with a diaphragm or stop between them. Lenses of high power are so small as to admit only a very small beam of light, and consequently what is gained in magnifying power is often worthless from deficient illumination. Various devices have been employed to overcome this difficulty. The light may be concentrated by achromatic condensers placed beneath the stage, or the curvature of the lens may be such as to allow as large a number of divergent rays as possible to impinge upon it. Such a lens is said to have a large 'angle of aperture,' the angle of aperture being that made by two lines converging from the margins of the lens to its focal point. Recently lenses, termed 'immersion lenses,' have been constructed of such a curvature that, when immersed in a drop of water placed over the object, light is admitted on all sides. With an immersion lens, there is high magnifying power with sufficient illumination.

Fig

The following diagram (fig. 5) explains the manner in which the compound M. acts. We have here represented the triple achromatic objective, consisting of three achromatic lenses combined in one tube, in connection with the eye-piece, which consists of the field-glass FF and the eye-glass EE. Three rays of light are represented as proceeding from the centre, and three from each end of the object. These rays would, if not interfered with, form an image at AA; but coming in contact with the field-glass FF, they are bent, and made to converge at BB, where the image is formed, at which place a stop or diaphragm is placed to intercept all light, except what is required to form a distinct image. From BB, the rays proceed to the eye-glass exactly as they do in the simple M., and as explained in fig. 1. The image, therefore, formed at BB is viewed as an original object by an observer through the eye-piece EE. The lens FF is not essential to a compound M.; but as it is quite evident that the rays proceeding to AA

would fall without the eye-lens EE, if it was removed, and only a part of the object would thus be brought under view, it is always made use of in the compound M.

A mirror is placed under the stage for reflecting the light through the object under observation. This method of illumination by transmitted light is used when the object is transparent. When opaque, light is reflected on the object by a bull's-eye lens, called a condenser. The best instruments are supplied with six or seven object-glasses, varying in magnifying power from 20 to 2,500 diameters. The eye-pieces supplied are three in number, each of which consists of two plano-convex lenses, between which a stop or diaphragm is placed, half-way between the two lenses. As the magnifying power of a compound M. depends on the product of the magnifying powers of the object-glass and the eye-piece, it follows that its power may be increased or diminished by a change in either or both of these glasses. In the mechanical arrangements, it is of importance to have the instrument so constructed that, while every facility is afforded for making observations and easy means of adjustment, there should also be great steadiness, without which, indeed, no satisfactory results will be obtained. These ends are achieved in various ways, of which fig. 6 is one of the simplest: *a*, brass stand, supported on three feet; *b*, mirror, supported on trunnions; *c*, diaphragm, pierced with circular holes of various sizes, to regulate the admission to the object of reflected light from the mirror; *d*, stage-plate, on which the object is placed; *e*, screw, with milled head for fine adjustment; *f*, the object-glass or objective; *g*, brass tube, in which the body of the instrument is moved, to effect the coarse adjustment; *h*, the eye-piece or ocular. See SOLAR MICROSCOPE.

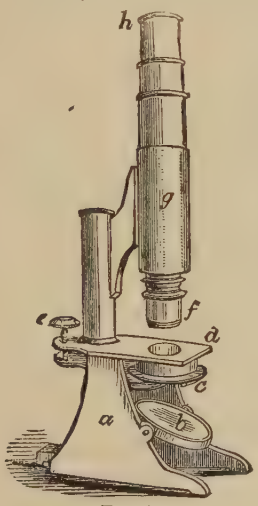


Fig. 6.

The M. has now become so important an instrument in education that almost every department of science in which it can be employed has a M. suited to its particular kind of work, and a special treatise explaining and illustrating its use; and many branches of science have instruments peculiarly their own. Thus, chemists, anatomists, zoölogists, etc., have each a special M. From this instrument the chemist, and natural philosophers generally, have derived great assistance in studying the different kinds of crystals; for, by means of it, they can not only observe and recognize the great variety of forms

that exist, but at any moment, and with little trouble, they may witness the process of crystallization, and leisurely study it. Those sciences in which it is most used, and for which it has done most, are anatomy, physiology, botany, zoölogy, medicine, mineralogy, and geology. In the practice of medicine, all medical men who aim at a scientific treatment of disease have fully recognized its usefulness as an agent in diagnosis, especially in diseases of the kidneys. In the detection of crime and the vindication of innocence, it is no less useful, as by means of it it is possible to determine with certainty whether a suspicious stain, found, e.g., on the clothing of an individual charged with murder, has been caused by blood or by another coloring-matter. In like manner, it can be determined whether hair found in similar circumstances belongs to a human being or not. The M. makes it possible also to distinguish the difference between substances that have a similar chemical reaction (e.g., the various kinds of starch, as flour, potato, sago, etc.); and thus we are provided with an agent quick in detecting adulteration.

Amateur observers choosing an instrument should remember that the simpler it is the better. The essential point is to have good glasses, which are tested by their power of showing some very minute markings, such as we find on diatoms. The circumference of the field of view should not be tinged with color, and the definition should be as good at the edge as at the centre. The beginner should use low powers in preference to high ones. The best light is that reflected from a white cloud during the day. Artificial light should, if possible, be avoided. The table must be steady on which the microscope is placed, and when not in use the instrument should be covered by means of a glass shade. The observer also requires a few oblong glass slides and a few circles of thin glass, called covering-glasses, to lay over the preparation under examination. For making sections, dissecting, and the various manipulatory operations attending the use of the M., he requires, moreover, a pair of forceps, a knife, or, perhaps better, a razor ground flat on one side, a few needles fixed in handles, and two or three hair-pencils. So equipped, the observer is able to begin examinations of texture at once with pleasure and advantage. Begin with simple objects, such as pollen and thin slices of the cuticle of flowers, mosses, and different kinds of starch, such as *tous le mois*, buck yam, cycas, arrow-root, etc., and notice particularly their different characters. Make as thin a section as possible, place it on the centre of the slide, and allow a drop of water to fall on it from the end of the handle of the needle. Then allow the covering-glass to fall gently on it—obliquely, so as to press out any small bubbles of air. Also have near a few bottles containing 'reagents,' such as dilute acetic acid (equal parts of pyroligneous acid and water) and liquor potassæ: by means of these reagents, peculiarities of structure may often be observed.

For a more complete account of the different kinds of microscopes, and the various purposes to which they are applied, see Quekett, *On the Microscope* (1855); Carpenter, *The Microscope* (1862; 6th ed. 1880); works on the microscope by Hogg and Beale; *The Microscopist*, by Wythe (3d ed. 1877).

MICROSCOPES, PROJECTION, AND THEIR USE: A microscope is a device which consists, essentially, of one or more glass lenses and assists the eye in seeing minute objects. In using a simple or compound microscope the light from the object passes through the lenses directly into the eye of the observer. A projection microscope differs from an ordinary simple or compound microscope in that the light from the object, after passing through the instrument, is focused upon a screen where the magnified picture of the object may be viewed by the eyes of hundreds of observers at the same time. In this general sense all stereopticons and other devices for producing magnified pictures on screens are projection microscopes. The term, however, is restricted in use to include only the instruments which are adapted by their lenses for use with small or microscopic objects or parts of larger ones (Fig. 2), and make them visible on a screen (Figs. 1, 5, 6).

It is evident, therefore, that projection microscopes, like stereopticons, must be used in darkened rooms. How to obtain a satisfactory light is the first and most difficult problem in practical microprojection, as the following considerations demonstrate. In using a compound microscope a large proportion of the light passing through the lenses enters the eye of the observer and falls directly upon a small area—say, one-fifth of a square inch—of the sensitive retina, and, therefore, a brilliant light is not needed on the object. In pictures projected on a screen the light passing through the projection microscope may make a picture 10 ft. or more in diameter (Fig. 1), and have an area of 56,548 times one-fifth of a square inch. Or, stated in another way, the picture of a single cell of a plant has been magnified 8,800 diameters on the screen when using an electric arc-light. In this case the area of the picture of the cell was $8,800 \times 8,800 = 77,440,000$ times the area of an optical section of the cell. Moreover, the light falling upon the screen is absorbed, in part, and the portion reflected to the eyes of the observers is weakened by diffusion. Projection microscopes, therefore, require an intensely brilliant light on the objects which are to be shown, and the light must be stronger in proportion to the increase in the magnification of the projected picture. Sunlight, thrown into a darkened room by a porte-lumière or heliostat, is the most powerful and best light when available. A 90° electric arc-lamp consuming about 15 amperes of current is the most useful and generally available source of light for microprojec-

tion. The best oxyhydrogen lights are usable with low powers and the more transparent objects, but cost more per hour than the electric arc-light.

How to concentrate the light upon the object so as to develop the maximum efficiency of the illuminant is the second practical problem in microprojection. It is most successfully solved by using a series of plano-convex lenses, called condenser lenses or condensers, in the manner shown in Fig. 2. Light radiates from the illuminant, passes in succession through a thick, medium and thin condenser, then through a cooling tank and, in some cases, through a sub-stage condenser to the object which is placed on the stage of the projection microscope. The light which passes through the more or less transparent or translucent object is refracted by the lenses of the projection microscope and focused upon a screen, producing an enlarged picture of the object in its natural colors. The size of the picture of any object on the screen may be varied (1) by using projection objectives of different magnifying powers, (2) by using in connection with the objective an eyepiece, or amplifier, and (3) by varying the distance between the projection microscope and the screen, shorter distances giving smaller but more brilliantly lighted pictures. If sunlight is used, instead of electric arc or oxyhydrogen light, only one large condenser of 6½ in. focus and a substage condenser are needed for concentrating the parallel solar rays upon the object. All other details of adjustment and manipulation are the same for all lights.

Details of lesser, but practical, importance may be briefly summarized. Electric currents, either direct, which is preferable, or alternating, of any voltage between 52 and 220 are most satisfactory for all projection work, and require rheostats adapted to the current and lamp. When the oxyhydrogen light is used, a cylinder of lime and the gas jet are substituted for the carbons of the arc-light (Fig. 2), all other details being

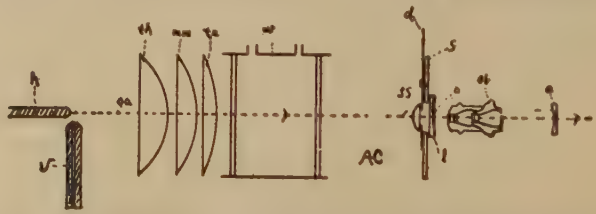
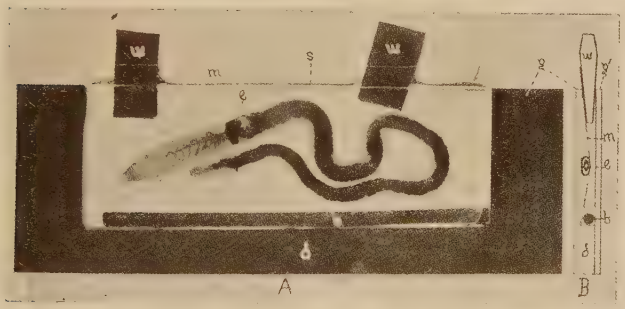


Fig. 2. Essentials of a Projection Microscope Using a 90° Electric Arc-lamp.

(Diagram of vertical section along the optical axis.) *h*, horizontal carbon; *r*, vertical soft-cored carbon; *oa*, optical axis of the condensers and microscope; *th*, thick; *mm*, medium, and *tn*, thin condensers; *w*, cooling tank; *ss*, substage condenser; *d*, diaphragm; *s*, stage of projection microscope; *o*, object, in live-cell *c*; *ob*, projection objective, and, *a*, amplifier.

PROJECTION MICROSCOPE.



For description see opposite page.

PROJECTION MICROSCOPE.

DESCRIPTION OF ILLUSTRATIONS.

FIG. 1. A FRESH-WATER HYDRA AS SHOWN ALIVE BY A PROJECTION MICROSCOPE.* Sunlight was used with a low power (1-inch) microscopic objective. The tentacles of the *Hydra* measured one-fourth inch from tip to tip, while the corresponding measurement of their picture was nearly nine feet. The lecturer, standing close to the screen, was pointing out the mouth of the *Hydra* at the instant the photograph was taken.

*Figs. 1–6 from '*Manual of Biological Projection and Anesthesia of Animals*,' by A. H. Cole (Copyright 1907) by permission of A. H. Cole, Chicago, Publisher.

FIG. 3. TADPOLE MOUNTED IN WATER IN A GLASS CELL FOR PROJECTION. This most useful cell is 3x1 inches in size and B and C show its shape. It is a microscopic aquarium in which small animals and plants will live for days ready to be projected at any moment.

FIG. 4.—(A) AN EARTHWORM, ALIVE AND ANESTHETIZED, MOUNTED FOR PROJECTION IN COLE'S COMPRESSOR CELL. (B) DIAGRAM OF A VERTICAL SECTION OF THE CELL.—The earthworm, *e*, compressed to about one-half its normal thickness by the pressure of a flexible sheet of clear mica, *m*, which is held against the inside of the front glass, *g*, at the bottom of the cell by the brass wire, *b*, and against the top of the same glass, by the wedges, *ww*. The front and back of the cell, *gg'*, are three by one inch microscopic object slides, cemented on strips of window glass, *d*, about one-eighth inch thick. The cell is filled with chloretone anesthetizing solution to the level, *s*. The worm was alive and its 'hearts' were beating vigorously when photographed. The line from *e* terminates just above the gizzard which was half filled with food and grains of sand. The crop is the dark mass at the left of the gizzard and the stomach-intestine begins at the right side of the gizzard, as seen in the picture, both appearing black on account of the food which they contained. The curved line above the gizzard is the dorsal blood-vessel. At the left of the crop the dorsal blood-vessel gives off six pairs of pulsating vessels, the 'hearts,' which extend around the esophagus. The buccal sac is protruded from the mouth in the form of a funnel, as in the act of eating. The 'brain' is just back of the mouth on the dorsal side of the pharynx.

FIG. 5. OPTICAL SECTION OF HEAD AND PROTHORAX OF A NYMPH OF DRAGON-FLY (*AGRION*).

The live nymph was anesthetized and projected on a screen for class study. The large dark spots are the compound eyes and the brain is seen as a broad shaded portion connecting the eyes, and in it are seen fine dendritic branches of the tracheae, or air tubes, which show as black lines. Each compound eye would about cover a period used in the punctuation of this book, but the magnified facets of each eye were visible at a distance of 30 feet from the screen. The blood was seen flowing in the antennæ and legs.

FIG. 6. A GREEN PLANT (*ELODEA*) EVOLVING OXYGEN UNDER THE STIMULUS OF LIGHT FROM AN ELECTRIC ARC-LAMP IN A STEREOPTICON.

A vigorous tip was cut from *Elodea* growing in an aquarium, mounted in Cole's hollow-ground cell (Fig. 3) and projected with a 'quarter size' stereopticon lens, as are lantern slides.

The bubble of oxygen at the cut end of the stem was evolved while the photograph was being made of the plant as it appeared on a screen. The cells of the green leaves were visible in the vivograph.

unchanged. The illuminant must be adjustable at any point between 2½ and 5 in. from the face of the nearest condenser and be freely movable up, down, right, and left, so as to be easily centered in the optical axis of the condensers and microscope. Three plano-convex condensers 4½ in. in diameter are placed close to each other with their plane sides toward the light; the first from the light has a focal length of 5½ in., the second of 6½ in., and the third of 10½ in. The cooling tank has plane glass faces and should be filled with distilled water or clear saturated solution of alum in water, for absorbing heat which might injure the objects or projection lenses. The projection microscope should be adjustable through a distance of 10 in. measured from the cooling tank to allow necessary adaptations of distance for projection lenses of different powers and to regulate the intensity of light which falls on objects of different degrees of transparency. The better grades of ordinary microscopic objectives and special projection objectives of all powers up to and including one-twelfth in. oil immersion objectives may be used in microprojection. The object to be projected is placed on the stage of the microscope a little beyond the principal focus of the system of condensers, a point easily determined by diffusing smoke or chalk dust in the converging rays. With objectives of powers higher than ½ or ⅔ in. a plano-convex lens 1 in. in diameter and of $\frac{13}{16}$ in. focus is used to increase the light in the picture. Eyepieces are not necessary but may be used to increase the magnification, though a plano-concave lens used as an eyepiece and called an amplifier increases the size of the picture with less loss of light.

A summary of some of the types of objects and the chemical, physical, and vital phenomena which are regularly projected for class study and for illustrating lectures will indicate the wide range of usefulness of projection microscopes. A chemical test of a food is demonstrated by projecting white potato and testing its starch grains with iodine, and the effect of digestive juices by comparative tests of cooked potato without and after its treatment in fresh saliva. Starch in raw white potato may be cooked by the heat in the light that shows the entire process on the screen. The immediate effect and absolute necessity of sunlight, or electric arc-light, in the manufacture of starch and evolution of oxygen by green plants is one of the easiest of all demonstrations (Fig. 6), and may be varied to show the effects of minimum temperatures, i. e., frost and freezing, and maximum temperature. Projected pictures which show vital phenomena, e.g., the evolution of oxygen by a live plant (Fig. 6), or the various animal activities recorded below are called vivographs. Small and even microscopic live animals and plants of hundreds of species of common occurrence may be mounted in glass cells of

various shapes and sizes (Figs. 3 and 4), usually in clear water, and their projected vivographs show the curious forms, peculiar movements, instructive anatomical details, and many usually unseen vital phenomena of the live organisms with an accuracy of detail and color unattainable in photographs, lantern slides, or charts. The effects of anesthetics, especially of chloretone (see Anesthesia of Animals and Plants), which is peculiarly well adapted to use on lower animals and plants, is demonstrated whenever an active organism is quieted by its use so that its vivograph may be accurately observed or photographed (Figs. 3-5). Animals catching prey and swallowing it are points of interest in projected fresh-water *Hydra* (Fig. 1) and nymph of the dragon-fly *Agrion* (Fig. 5). The structure of the alimentary canal and the movements of the muscular gizzard in grinding food are seen in projected earthworms (Fig. 4). The flow of the blood is readily shown in tadpoles (Fig. 3), tail of goldfish, foot of frog, and antennæ and legs of small crayfish. The beating of the heart is readily demonstrated in small earthworms (Fig. 4), small flat-spiral pond-snails, and the water-flea, *Daphnia.* Movements of the valves of the heart is a difficult, but possible, demonstration with the water-flea, *Daphnia pulex,* and nymph of dragon-fly, *Agrion.* Asexual development is shown in budded *Hydras,* and the development of the embryo in the egg may be followed for days through all its stages with the eggs of pond-snails. The different stages in the metamorphosis of insects, e.g., mosquitoes, and of frogs, furnish instructive vivographs. The projection of the method of killing mosquitoes with oil on water is a practical lesson in sanitary science. The amount and variety of material available for successful use with projection microscopes is unlimited. Complete details of apparatus and methods of collecting, mounting, cell making, anesthetizing, and projecting numerous typical species are given in Cole's *Manual of Biological Projection and Anesthesia of Animals.*

MICROSCOP'IC ANIMALS. See ANIMALCULE.

MICROSCOPY, CLINICAL: the use of the microscope in the diagnosis of disease. Consumption of the lungs may be microscopically diagnosed by an examination of the sputum, though the patient be 1,000 miles away, and in the same manner a number of diseases of allied forms may be recognized by certain minute evidences interpretable by the microscope. The most important of the intestinal parasites that can be thus identified are the tapeworm, roundworm, hookworm, fluke-worm, and pinworm. In all of these the physician, by a microscopical examination of the fæces, can detect the presence of the eggs of the different kinds of worms and the precise kind of worm can be known by the characteristic configuration of the eggs. Examination of the

fæces by the microscope can further detect various forms of indigestion and various kinds of inflammation in the intestinal tract. The influenza bacillus, the bacillus of diphtheria, the organism of cholera, of dysentery, of malignant pustule, of blood-poisoning, of pneumonia, of actinomycosis, etc., can all be identified by a microscopical examination, as also can a number of diseases due to animal parasites in the body, other than intestinal worms. The presence of *Trichina* in the body can also be learned by the peculiar changes that take place in the blood, and the blood-parasite *Filaria* is recognizable under the microscope. There are many blood-diseases which can be diagnosed by simple examination. Anæmia and pernicious anæmia are important examples. Moreover, most of the acute infectious diseases cause certain changes in the blood which may be utilized in microscopical work for diagnostic purposes. Microscopical examination of the urine has long been practiced. By it various forms of disorder of the bladder and of the kidneys can be told, and both renal disease and bladder-disease can be detected long before such troubles become chronic and dangerous. In much the same manner the microscope can be used to examine other secretions and excretions of the human body.

MICROSPORANGIA, n. *mī'krō-spō-rănj'ĭ-ă* [Gr. *mikros*, small; *spora*, seed; *anggos*, a vessel]: in *bot.*, cells or thecæ containing microspores.

MICROSPORES, n. plu. *mī'krō-spōrz* [Gr. *mikros*, small; *spora*, seed]: in *bot.*, small reproductive spores in the capsules of Lycopods; applied to certain vegetable parasites present in various cutaneous affections—also in same sense, MICROSPO'RON, n. *-spō'rŏn.*

MICROSTYLAR, a. *mī-krō-stī'lĕr* [prefix *micro-*; Eng. *stylar*]: in *arch.*, having a small style or column; an epithet applied to a style of architecture in which there is a separate small order to each floor.

MICROTASIMETER, *mī-krō-ta-sĭm'ĕ-tĕr:* instrument for measuring very minute variations of pressure in bodies, caused by changes of temperature, moisture, etc.; invented by Thomas A. Edison. It is based on the combined principles of the pyrometer, hygrometer, and barometer. It was successfully used during the solar eclipse of 1878 and since for measuring the heat given forth by the sun's corona. It is used also to note the variations of temperature, caused by clouds passing over the sun's disk, or by increase or decrease of moisture. Its peculiarity consists in the effect which the pressure of the expanding rod has on the electric resistance of a piece of carbon placed in the circuit of a galvanic battery. A rod of vulcanite is used when slight variations of temperature are to be noted. This rod is fixed in a strong frame, kept at an even temperature, with its lower end fitted into a slot in a metal plate which rests on a carbon button. This button is an electric circuit which includes

a galvanometer. The least variation in the length of the rod, caused by its expansion owing to the heat rays being centred upon it by means of a kind of funnel, changes the pressure on the button and thus the resistance of the current, which is at once indicated by the galvanometer. For use as a hygrometer a strip of gelatine is substituted for the vulcanite.

MICROTHERMS, n. plu. *mī′krō-thermz* [Gr. *mikros*, small; *thermē*, heat]: in *bot.*, plants which require only a small degree of heat to bring them to perfection.

MICROTOME, n. *mī′krō-tōm* [Gr. *mikros*, small; *tomē*, a cutting]: an instrument for making very fine sections for the purpose of being examined under the microscope.

MICROZAMIA, *mī-krō-zā′mĭ-a:* genus of plants of nat. order *Cycadaceæ:* widely diffused over Australia. The fronds resemble those of palms, and are used in the Rom. Cath. Church on Palm Sunday. The underground stem is large and turnip-like, but covered with scales or leaf-scars, and contains a substance resembling tragacanth. The nuts of *M. spiralis* are edible, but are used only in times of scarcity.

MICROZOA, n. *mī′krō-zō′ă* [Gr. *mikros*, small; *zōŏn*, an animal]: a term employed to denote minute animal organisms whose forms can only be defined by the aid of the microscope. MI′CROZO′AL, a. *-ăl*, pertaining to.

MICROZYMES, n. plu. *mī′krō-zīmz* [Gr. *mikros*, small; *zumē*, fermenting matter, leaven]: a general term for very minute organized particles which present themselves in liquids fermenting or undergoing decomposition; the minute organized particles which are supposed to be the contagious matter in zymotic diseases.

MICTURITION, n. *mĭk′tū-rĭsh′ŭn* [L. *micturītus*, having the desire to make water]: the act of making water, or the desire to pass the urine; a too frequent passing of urine in consequence of disease.

MID, a. *mĭd* [Goth. *midja;* Gr. *mesos;* Skr. *madhya;* L. *medĭŭs;* Icel. *midr;* Ger. *mittel*, middle: Icel. *midill*, means—from *midla*, to divide]: at an equal distance from the extremes; middle. MIDDAY, n. noon: ADJ. pertaining to noon; meridional. MIDFEATHER, in a *steam-engine*, a vertical water-space in a fire-box or combustion-chamber. MID-HEAVEN, or MID-AIR, the middle part of the heaven or sky; the position of anything raised and suspended considerably above the surface of the earth. MIDLAND, a. being in the interior; distant from the sea. MID-LENT, 4th Sunday in Lent; the middle of Lent. MID-LIFE, the middle of the age of man, or the period of life about 50. MIDNIGHT, 12 o'clock; the middle of the night. MIDRIB, in *bot.*, the principal

nerve or vein, which extends from the base of the leaf to its apex. MID-SHIP, pertaining to the middle part of a ship. MIDSHIPMAN, a junior naval officer in a ship of war or a first-class merchant vessel (see below). MID-STREAM, the middle or centre of the stream. MID-SUMMER, the middle of summer; the time about June 21st. MID-SUMMER'S DAY, one of the quarter-days of the year in England, occurring June 24 (see LANDLORD AND TENANT). MID-SUMMER EVE (see ST. JOHN'S, EVE OF). MIDWAY, a. being in the middle of the way or distance: N. the middle of the distance: AD. half-way. MID-WINTER, the middle of the winter, about Dec. 21; the middle of severe winter weather.

MIDA, n. *mī'dă* [Gr. *midas*, a destructive insect in pulse]: the grub of the bean-fly.

MIDAS, *mī'das:* common representative name in Greek tradition of the more ancient Phrygian kings, of whom M., legendary son of Gordius and Cybele, is the most famous, said to have been pupil of Orpheus. He was closely connected with the cultus of Dionysus or Bacchus, and among the many legends regarding him is one, that Bacchus granted his wish that whatever he touched might become gold; from which so great inconvenience ensued, that he was glad to get relief from the burden by washing, at the command of the god, in the Pactolus, the sands of which became thenceforth productive of gold. Another legend represents him as having offended Apollo by assigning the prize in a musical competition to Pan, and as having therefore been endowed by him with a pair of ass's ears, which he concealed under his Phrygian cap, but which were discovered by his servant. The historical Phrygian monarchy was destroyed by the Cimmerians about B.C. 760, and the last King M. committed suicide.

MI'DAS: genus of platyrhine monkeys, of family *Hapalidæ*, *hăp-ăl'i-dē:* see TAMARIN.

MIDDELBURG, *mĭd'dĕl-bĕrĕh:* town of the Netherlands, cap. of the province of Zeeland, in the island of Walcheren. It is connected with the sea by a canal, five m. long, admitting ships of heavy burden, and is a station of the railway from Flushing to Roosendaal to join the Dutch and Belgian lines. The city is nearly circular, and a league in circumference, surrounded by a broad canal. In former times, M. was one of the leading mercantile cities of the United Provinces, sending many ships to the E. and W. Indies, America, and all European ports, founding the colonies of Surinam, Berbice, Essequibo, Demerara, etc.; but the opening of the Scheldt for Antwerp, and other causes, have reduced the foreign trade to single ships to Java. Many of the inhabitants are wealthy, which, with its being the meeting-place of the provincial states of Zeeland, and having considerable trade in grain, salt, etc.—making beer, vinegar, starch, leather, and with snuff, chocolate, oil and saw mills, and foundries—make it still a city of

importance. It is the finest city of the northern provinces, having handsome houses, ornamented with gardens, and the canals and streets shaded with trees. The townhouse, founded 1468, has a beautiful tower, and is decorated with 25 colossal statues of Counts and Countesses of Holland. At the beginning of the 12th c., an abbey was founded, which was, later, enriched by Willem II., Count of Holland and Zeeland. The buildings are now occupied as the meeting-place of the provincial states. Middelburg does not date further back than the 9th c. In 1574 the Spaniards, under Mondragon, were compelled by famine to give up Middelburg, after having defended it 22 months against Prince Willem I. Though troops are stationed in Middelburg, it is no longer tenable against an enemy. Pop. 18,650.

MIDDEN, n. *mĭd'n* [Icel. *moddyngia;* Dan. *mödding,* a dunghill—from Icel. *mod,* refuse; *dyngia,* a heap]: in *Scot.* and *N. of Eng.,* a dunghill; a manure-heap; an ancient deposit or mound of refuse made by man.

MIDDLE, a. *mĭd'l* [from MID, which see]: equally distant from the extremes; intervening: N. the point or part equally distant from the extremities; the time which passes, or the events which happen, between the beginning and the end. MIDDLE-AGED, at about the age of 50. MIDDLE BASE and MIDDLE CHIEF, in *her.* (see POINTS OF ESCUTCHEON). MIDDLE C, in *music,* the note a fifth above the F or bass-clef, and a fifth below the G or treble-clef. The C clef always represents Middle C. MIDDLE CLASS, a name used to designate the classes of society which include professional men, merchants and traders, bankers, and the like; the classes between mechanics and the aristocracy. MIDDLE-DECK, in a ship having three decks, that situated between the other two. MIDDLE GROUND, in *painting,* the central portion of a landscape. MIDDLE LATITUDE SAILING (see SAILINGS). MIDDLE-MAN, an agent between two parties; in *Ireland,* one who rents large tracts of land from the proprietor, and lets out small portions to the peasantry. MID'DLEMOST, a. in the middle or nearest the middle. MIDDLE PASSAGE, in the *slave trade,* the part of the Atlantic ocean lying between Africa and the West Indies. MIDDLE POST, in *arch.,* the same as king-post. MIDDLE TEMPLE, one of the four English Inns of Court, having the exclusive privilege of calling persons to the bar (see INNS OF COURT). MIDDLE TERM, in *logic,* the term of a syllogism with which the two extremes are separately compared. MIDDLE TINT, in *painting,* a mixed tint in which bright colors do not predominate.

MIDDLE ACADEMY: the title of the school which succeeded the Older Academy in the teaching of Plato's doctrines. Arcesilaus and Carneades are generally mentioned as its leaders. They flourished from about 315 to 129 B.C.

MIDDLE AGES: great historic period between the times of classic antiquity and modern times. The beginning and close of this period are not very definite; it is usual, however, to regard the M. A. as beginning with the overthrow of the Western Roman Empire 476; and there is a somewhat general concurrence in fixing on the period of the Reformation, or, with some writers, the revival of learning in Europe, as marking its close. Thus in round numbers, the M. A. may be assigned to the thousand years 500–1500. The Dark Ages (q.v.) is a term still more indefinite, perhaps best applied to a portion of the M. A., about 600–1000. The M. A. began with the rise of the Frankish on the ruins of the ancient Roman Empire, and with the commencement of civilization among the barbarous tribes which had taken possession of the former Roman provinces. During the M. A., the different nations of modern Europe were formed, and their political and social systems developed. It was a period of much superstition; in connection with which religious enthusiasm extensively prevailed, manifested in many great religious endowments, in magnificent ecclesiastical buildings (see GOTHIC ARCHITECTURE), in pilgrimages (see PILGRIM), in monasticism (see MONACHISM), and, above all, in the Crusades (q.v.). In the earlier parts of this period, the church was much occupied in the extension of its bounds in n. Europe, where heathenism still lingered; and the means employed were not always consistent with the spirit of Christianity. During the M. A., the hierarchy acquired enormous power and wealth, and the papacy rose from comparatively small beginnings to its utmost greatness. During the M. A., chivalry had its rise and decline; modifying, and in many respects tending to refine, the feelings and usages of society. Toward the close of the period, the revival of letters, the increase of knowledge, and the formation of a wealthy and leading class in society, distinct alike from the aristocracy and the peasantry, tended, even before the Reformation, both to the diminution of the power of the hierarchy and the decay of the feudal system.—See FEUDAL SYSTEM: CHIVALRY: CRUSADES. See Guizot's *Histoire de la Civilisation;* Rühs's *Handbuch der Geschichte des Mittelalters;* and Hallam's *History of the Middle Ages.*

MIDDLE BASS ISLAND: see PUT-IN-BAY ISLANDS.

MIDDLEBOROUGH, *mĭd'l-bŭr-rŭh:* town in Plymouth co., Mass.; in the s.e. part of the state, on the Namasket river; at the junction of the Cape Cod branch of the Old Colony r.r., the Boston to Provincetown, the Middleborough Taunton and Providence, and the Old Colony and Newport; 12 m. from Plymouth, 20 m. from Fall River, 34 m. from Boston. It is one of the oldest towns in the co., and popular as a summer resort because of its historic associations as well as its picturesque scenery. Before Lakeville was taken from its territory, it was the largest town in the state; it still comprises 60 sq. m., on

both sides of the river, which flows in a winding course from several lakes 5 m. away, and empties into the Taunton r. Its 3 falls furnish excellent water-power, while the lakes abound in fish and afford numerous picnic grounds on their shores. The town comprises the thriving villages of North M. (Titicut), South M., The Rock, East M. (Eddyville), a number of smaller villages, and M. Four Corners, the central portion, known as M. Each of these villages has its churches, post-office, manufactures, etc. The town has several public halls, besides a town-house, containing a large hall, district-court room, a public library, a bank, and the town offices. About a mile from it is Muttock Hill cemetery, where lie buried some of the founders of the colony. M. was the seat of Peirce Acad., a Bapt. classical institution, founded 1808, which, however, has been discontinued, its prosperity having been fatally injured by the civil war. The system of graded public schools is in excellent condition. The town is regularly laid out, well lighted, and abundantly supplied with beautiful shade and ornamental trees, which have helped to make its drives so popular. The post-village of M. has 3 churches, 2 newspapers, a hotel, the Bay State straw-works, employing a large number of girls in its extensive factories and at their homes in the neighboring villages, several shoe factories, the Star woolen mills, manufactories of lumber, shovels, needles, trunks, boxes, and varnish, marble-works, and stores of various kinds. A considerable trade in horses from Vt. and Canada is carried on. Pop. (1890) 6,065; (1900) 6,885.

MIDDLEBURY, *mĭd'l-bĕr-ĭ:* town, cap. of Addison co., Vt., beautifully situated on Otter creek at Middlebury falls; on the Rutland division of the Central Vermont r.r.; 35 m. s. of Burlington, 33 m. s.w. of Montpelier, 33 m. n.w. of Rutland. Surrounded by attractive mountain scenery, it has 6 fine marble quarries, whose white and variegated marbles are exported in considerable quantities. Its excellent water-power runs several cotton and woolen factories; it has also flour mills and iron foundries, besides manufactories of sashes, doors, and blinds, cotton, wool, paper, and leather. It contains several newspapers, 6 churches, 3 hotels, a national bank, a well-organized fire department, has good public schools and a free public library. Pop. (1900) 3,045. MIDDLEBURY COLLEGE, founded 1800, and under the control of the Congregationalists, has its seat here. In 1901-2 it had 11 profs. and instructors, 123 students, 24,895 volumes in the library, scientific apparatus valued at $22,000, grounds and buildings valued at $200,000, productive funds $380,000, total income, excepting board and lodging, $25,000. Ezra Brainerd, D.D., LL.D, was pres., and the college was open to both sexes.

MIDDLE LEVEL: one of the three divisions of the remarkable district of 400,000 acres on the e. coast of England, known as The Fens, or BEDFORD LEVEL (q.v.), which, centuries ago, was converted into an unprofitable marsh by repeated incursions of the sea, together with obstructions to the outward flow of the rivers Nene, Cam, Ouse, Welland, etc. Vast operations have been carried on ever since the time of Charles I., by digging new channels and outfalls, and employing wind-mills and steam-engines to pump the water from the marshes and ponds into these artificial channels. In the M. L. (nearly the whole of whose 130,000 acres between the Nene and the Old Bedford river is about 15 ft. below high-water spring-tides) a notable irruption took place 1862, May 4. St. Germain's Sluice, at the confluence of the M. L. main outfall drain with the river Ouse, near the upper end of another artificial channel, gave way without warning. The rise of high-water spring-tide at that point was 19 ft., and the sill of the sluice was 6 ft. below low-water spring-tide. The tidal waters rushed up the opening, and ebbed and flowed throughout a distance of 20 m. After incessant exertions, the tidal waters were at length, June 19, effectually shut out by a strong coffer-dam, constructed by Hawkshaw, engineer. Another break in the embankment, about 4 m. distant, eight days after the first, admitted a rush of water which covered to a depth of 2 or 3 ft. 6,000 acres of fertile land, increased at successive high tides to 10,000 acres.

For riddance of the flooding waters, and for added outlet to the usual rivers, 16 enormous siphons were provided, to be placed *over* the coffer-dam: they were of cast iron, 3 ft. 6 inches internal diameter; they rested on the top of the dam, and on inclined frame-work supported by piles at the sides. The valves were so arranged that the siphons could be put in operation, either by exhausting the air or by filling them with water. When only six of the siphons were in position, they carried 50,000 gallons of water per minute over the dam.—For details see Hawkshaw's paper, before the Institute of Civil Engineers 1863.

MID'DLE PARK: one of the many fertile valleys, covering broad distances, in Summit co., Colo.; 7,500 ft. above sea-level; inclosed by spurs of the Rocky Mts., in the midst of the most varied and picturesque mountain scenery; 65 m. in length, 45 m. in breadth; about 3,000 sq.m. It is separated from North Park, directly n. of it, by one of the cross ranges of the main chain of the Rocky Mts. On the e. side of it is the Snow Range of mts., or continental divide, and lofty mountains surround it on every side, among which some of the highest and most prominent in the imposing landscape are Long's peak, Gray's peak, and Mt. Lincoln, each 13,000 to 14,000 ft. in height. The tract is watered and made fertile by the head-waters of the Grand river and the Blue river, which both flow w. to the Colorado. Most of the park has the appearance of a beautiful meadow, over whose

carpet of green are scattered wild flowers of brilliant colors and in great profusion; a considerable part, however, is covered with dense forest. Game abounds throughout this region, including bears, elk, deer, antelopes, and mountain sheep; while the waters contain a variety of fish. Its main attraction to tourists, however, seems to be its mild and genial climate and very equable temperature; also its hot sulphur springs. These are near a branch of the Grand r., 45 m. from Georgetown, 60 m. from Central City, about 12 m. from the s. boundary of the park. They are much resorted to by sufferers from rheumatism, neuralgia, and skin diseases. A settlement for the accommodation of invalids is growing into quite a town around these springs. 27 m. from them is Grand Lake, a beautiful sheet of water full of trout and other game fish: it also is a resort of tourists.

MIDDLESBOROUGH, *mĭd'dlz-bŭr-rō:* important market-town, port, and parliamentary borough in the N. Riding of Yorkshire, at the mouth of the Tees, 48 m. n.e. from York. It is the centre of the n. of England iron manufacture. The town is of recent growth, and owes its origin as a port to its convenient position for shipment of coal brought by railway from the mines in s. Durham. In 1842 a commodious dock was constructed, recently much enlarged, and admitting ships of the largest tonnage.

On the discovery, 1840, of immense beds of ironstone, extending through the whole range of the Cleveland Hills, a portion of which are close to the town, the smelting of iron was speedily begun on an extensive scale, since marvellously increased. To smelting have been added iron-foundries, manufacture of rails, locomotive engines, tubes, boilers, etc.; chemical works, potteries, and ship-building also are carried on to a large extent. The town of M. was incorporated 1853, and constituted a parliamentary borough 1868. The Royal Exchange, built 1867, is a large and handsome building; in its spacious interior, the weekly iron market is held. The Corporation Hall contains the custom-house. The high school, built at a cost of £25,000, was given to the town by Mr. Pease, M.P. Albert Park, 72 acres, was given by Mr. Bolckow. A new dock, costing £120,000, was opened 1875; the new cattle market 1876. There are numerous churches, some of them handsome. The jubilee of M. was celebrated 1881; a statue of Mr. Bolckow, one of its founders and chief promoters, being unveiled. In 1831 M. was an obscure hamlet with 383 inhabitants: pop. (1871) parliament. borough 46,643; (1901) 91,317.

MIDDLESEX, *mĭd'l-sĕks:* the metropolitan county of England, in the s.e. of the island; bounded n. by Hertford, s. by Surrey; about 60 m. inland (westward) from the North Sea, with which it communicates by the river Thames. Next to Rutland, it is the smallest of English counties; only 180,136 statute acres; but its popula-

tion is second only to that of Lancashire. The surface is, on the whole, level, with gentle undulations. The Thames, which forms its southern boundary, and its affluents, are the only rivers of the county. Two of these, the Colne and the Lea, form respectively the western and the eastern boundaries of the county. It is traversed by the Grand Junction and Regent's canal, and the New river, an artificial cut intended to supply the capital with water. The soil is in general poor, with the exception of a tract of good fertile loam along the Thames. The land is occupied chiefly for grass and hay farms and market-gardens. The county town is Brentford. Middlesex is subject to the city of London, and the whole county is in the diocese of the Bishop of London. Pop. (1901) 792,225.

MIDDLESEX FELLS, Boston, Mass.: a picturesque hill, wood, and lake reservation of the metropolitan park system of 'Greater Boston,' enclosing Mystic Lakes; area from 3,000 to 3,200 acres. The Fells are part of the townships of Malden, Melrose, and Stoneham.

MIDDLETON, *mĭd'l-ton*, ARTHUR: 1681—1737, Sep 7; b. South Carolina. He was educated in England, and returning, became prominent in colonial affairs. In 1704 he was appointed one of the commissioners to establish the Church of England as the state religion, became naval officer 1711, and was member of the council 1711-19. He exerted his political influence in favor of popular claims, opposing the lords proprietors, and finally heading the revolution which threw off the whole proprietary government and placed the colony under the immediate protection of the crown (1719). In 1725 he succeeded Nicholson as acting governor of the colony, which office he held till 1731, when the royal governor arrived; he then retained his position in the governor's council. His administration as governor was partly occupied by war and negotiations with the Spaniards of Florida and the French of Louisiana.—His father, EDWARD M. (1640—1700), b. England, inherited a large estate, spent some time at Barbadoes, and removed to South Carolina in the early days of the colony. He received a valuable land grant, and became a member of the council and an assistant judge.

MID'DLETON, ARTHUR: 1742, June 26—1787; Jan. 1: b. South Carolina. He studied in England, at Harrow and Westminster, and graduated from Cambridge; travelled in Europe two years; 1763 returned to South Carolina, and the following year married a daughter of Walter Izard. In 1765 he became a member of the commons, a position which he held several years. He visited England 1768, returned three years later, and became a leader in political affairs; was a member of the committee of safety and of the provincial congress 1775, a member of the continental congress 1776, and signed the declaration of independence. In 1778 he was

elected gov. of S. C., but declined. He assisted, 1780, in the defense of Charleston, sustained heavy loss of property, was taken prisoner, exchanged, and returned to congress, where he remained until peace was declared, when he became member of the state senate. He was a skilful stenographer and preserved a record of many important debates. Under the name 'Andrew Marvell' he wrote able political documents. Died at Goose Creek, S. C.—His father, HENRY M. (1717–1784, June 13), was a wealthy planter and zealous patriot; speaker of the commons 1745–47, commissioner of Indian affairs 1755, member of council 1755–70, pres. of continental congress 1774, and of provincial congress of S. C. 1775–6. He was returned to the continental congress, but on account of ill health was unable to serve and was succeeded by his son.

MID'DLETON, CONYERS, D.D.: clergyman of the Church of England: 1683–1750, July 28; b. Richmond, Yorkshire. He studied at Cambridge, where he took the degree B.A. 1702, was elected a fellow 1706, and shortly afterward married a lady of fortune. His life was a series of bitter and, on the whole, not creditable controversies, though he is said to have been rather an agreeable person in private. His first and most formidable opponent was Richard Bentley (q.v.); afterward, his polemics were chiefly theological. The views that he advocated were generally such as to draw on him the imputation of being an 'infidel in disguise,' though some of them—such as, that the Jews borrowed some of their customs from Egypt, and that the primitive writers in vindicating Scripture found it necessary sometimes to recur to allegory—are now established beyond doubt; while his opinion, that the Mosaic narrative of the creation is not literal truth, has since M.'s day been adopted by many of the most learned clergy even of his own church. He seems not to have forsaken any essentials of Christianity, but to have lacked devoutness of temper, to have been too ready for controversy, and to have been naturally suspicious regarding all things that claimed to be supernatural. M. died at Hildersham, in Cambridgeshire. One of his writings was *The History of the Life of M. Tullius Cicero* (2 vols. 1741), a work interesting and valuable, but neither very impartial nor quite accurate. His celebrated *Letter from Rome, showing an exact Conformity between Popery and Paganism; or the Religion of the present Romans derived from that of their Heathen Ancestors* (1729), provoked the most violent indignation among Rom. Catholics, and is still read with interest. All his pamphlets, treatises, etc., were collected and published under the title *Miscellaneous Works* (4 vols. Lond. 1752–57), containing much that is of value.

MIDDLETONITE, n. *mĭd'l-tŏn-īt:* a mineral resin found in the older Coal-formations, and occurring in layers, or in rounded pea-like masses, of a reddish-brown color—so called from *Middleton* collieries, near Leeds, where it was first discovered.

MID'DLETOWN: city, county seat of Middlesex co., Conn.; on the w. bank of the Connecticut river and on the New York, New Haven and Hartford railroad; about 15 m. s. of Hartford. It is connected with Portland (noted for its brownstone quarries) on the opposite bank, by a long drawbridge. M. has considerable trade, the river being navigable as far as Hartford for light draught vessels, such as can cross the bar at Saybrook. The city is in an agricultural region, the principal product of which is tobacco, and has manufactories of hardware, silver-plated ware, locks, harness trimmings, rubber goods, silks, pumps, bone goods, hammocks, cotton webbing, etc. In the vicinity are valuable mineral deposits. The city contains public and parish schools, the Wesleyan Univ., the Berkeley Divinity School (P. E.), the State Hospital for the Insane, the State Industrial School for Girls, the Russell Free Library, with 15,000 volumes, a handsome municipal building and numerous churches, banks, etc. M. was founded 1650, was incorporated as Mattabeseck 1651, and received its present name in 1653. It was incorporated as a city 1784 and received a new charter in 1882, under which the city is now governed. This charter provides for a mayor, who holds office two years, and a city council, the subordinate officials being appointed by the mayor and council. Pop. (1890) 9,013; (1900) 9,859.

MID'DLETOWN: city in Orange co., N. Y., near the Wallkill river, e. of the Shawangunk Mts., and w. of the highlands of the Hudson; 24 m. s.w. of Newburgh, 66 m. n.w. of New York on the New York, Ontario and Western, the New York, Susquehanna and Western and the Erie Railroads. It is in a fertile agricultural region, has a large trade in dairy products, live-stock and garden produce, and its chief manufactures are hats, shirts, saws, files, cut-glass, cigars, condensed milk, leather, paper boxes, carpet-bags, printers' supplies, etc. The city also contains the shops of the N. Y., O. & W. railroad. It is the seat of a State Homeopathic Hospital for the Insane, St. Joseph's Academy (Rom. Cath.), the Thrall Public Library, and contains numerous churches, seven public schools, one parish school, an excellent high school, two national, one savings and one trust company banks, with combined capital of $400,000, several public halls, an opera house, hotels, etc. It is regularly laid out, with wide streets, well shaded, lighted, paved and sewered. It has a police force, a board of health, and a fire department. Its supply of water is from Lake Monhagan, 2 m. distant, its reservoir covering 80 acres, nearly 200 ft. above the town. In the s.w. part is Hillside cemetery, 50 acres in extent, beautifully laid out and well kept. The city was settled about the middle of the 18th century, and was at first a part of Wallkill township. It was incorporated as a village 1848, and received its city charter 1889, June 27. The government, under a revised charter of 1902, consists

of a mayor, who holds office two years, and a common council of nine members, elected for two years. The board of health is appointed by the mayor, with the approval of the council; the engineer, city clerk and corporation counsel are elected by the council and other municipal officials are elected by popular vote. Pop. (1900) 14,522.

MID'DLETOWN: city in Butler co., Ohio; on the Miami river, the Miami and Erie canal, and the Cincinnati, Hamilton and Dayton, the Cleveland, Cincinnati, Chicago and St. Louis and the Cincinnati Northern railroads, about 34 m. n. of Cincinnati. It is in an agricultural region, but its chief industries are the manufacture of tobacco, bicycles, agricultural implements, paper, flour, etc. The city contains a Masonic Temple, an opera house, several churches, and public and parish schools. It was settled about 1794, and is governed by a mayor and council, elected for two years. The city owns and operates the waterworks. Pop. (1900) 9,215.

MIDDLETOWN: borough in Dauphin co., Pa.; on the Susquehanna river and on the Philadelphia and Reading and the Pennsylvania railroads; about 10 m. s.e. of Harrisburg. It is in a farming region and also has extensive manufacturing interests, the principal products being foundry and machine shop products, flour, dressed lumber, leather, stoves, furniture, tubing and iron cars, etc. There are also stone quarries in the vicinity. The trade consists chiefly of manufactured articles and farm and dairy products. There are several churches, public schools, banks, etc. The borough was founded in 1756, and was incorporated in 1828. The borough owns and operates the electric light plant. Pop. (1900) 5,608.

MID'DLEWICH: small market-town of Cheshire, England, on the Grand Trunk canal, 20 m. e. of Chester. Salt is extensively made; boat-building is carried on, and brick-works are in operation. Pop. over 3,300.

MIDDLING, a. *mĭd'lĭng* [from *middle* (see MID)]: of middle rank or degree; neither high nor low; of middle average quality; of moderate capacity; mediocre. MIDDLINGS, n. plu. *mĭd'lĭngs*, the coarser part of the flour left in the dressing-machine; see WHEAT.

MIDGARD, *mĭd'gärd*, in Scandinavian mythology, the dwelling place of the human race, formed out of the eyebrows of Ymir, one of the first giants, and joined to Asgard, the abode of the gods, by the rainbow-bridge.

MIDGE, n. *mĭj* [Ger. *mücke*, a small fly—from *mucken*, to hum: Dut. *mug*, a gnat: Bohem. *maucha;* L. *musca;* F. *mouche*, a fly]: common name of many species of small dipterous insects, of family *Tipulidæ*, much resembling gnats, but having a shorter proboscis. Their larvæ are aquatic; the perfect insects are often very annoying to human beings and to cattle. The little pink-colored tortuous worm known to anglers as the *Blood-worm*, frequent in water-barrels and in the mud near the edges of ponds and ditches, is the larva of a species of M. (*Chironomus plumosus*), a little larger than the common gnat, abundant in some marshy situations. The larva is much sought by birds and is a very tempting bait for fish. The pupa is cylindrical, with respiratory organs on the sides of the thorax. When the insect is ready to quit its pupa case, it rises to the surface of the water, and there remains suspended for a short time; the perfect insect, when it has issued from the case, also stands for a short time on the surface of the water. The genus is remarkable for the long hairs with which the antennæ of the male are furnished.—Another genus of Midges (*Simulia*) contains many species most tormenting to men and cattle, by entering the ears and nostrils, and alighting on the eyelids. They swarm on marshes and damp heaths in the warmer months. But none of them is nearly so mischievous as a species (*S. columbaschensis*) on the banks of the Danube, sometimes in such dense swarms that horses and cattle are suffocated by the numbers which enter the wind-pipe.—The common gnat is popularly termed Midge.

MIDGET, n. *mĭj′ĕt* [dim. of *midge*]: very diminutive creature: Canadian name for the sand-fly.

MIDHURST, *mĭd′ĕrst:* market-town of England, in Sussex, on the Rother, a navigable tributary of the Arun, 50 m. s.w. of London. Here are the ruins of an old castle of the De Bohuns, lords of M.; and within half a mile e. of the town stood Cowdry House, seat of the Montagues, which was burned 1793. At the grammar school, founded 1672, Richard Cobden was educated. Pop. (1861) 6,405; (1871) 6,753; (1881) 7,277.

MIDIANITES, *mĭd′ĭ-an-īts:* an Arab race, descended, according to Scripture, from Midian, son of Abraham by Keturah; thus distant kinsmen of the Israelites. They occupied the greater part of the country between the n. side of the Arabian Gulf and Arabia Felix, as far as the Plains of Moab. Others more civilized (if not, indeed, of Cushite origin) dwelt in the vicinity of the Sinaitic peninsula, and carried on a trade, particularly with Egypt. To the latter, we may presume, belonged Jethro, priest or 'sheik' of Midian—father-in-law of Moses. The main body of the M., in later times, were very troublesome neighbors to the Israelites till Gideon's great victory over them. They appear as a strong Bedouin confederation, given to invasion and ravage. Their national god was Baal-Peor.

MID-LO'THIAN. See EDINBURGHSHIRE.

MIDNAPUR, or MIDNAPOOR, *mĭd-na-pôr'*: chief town of the district of Midnapur in India; on the n. bank of the Kasái river; about 65 m. s.w. of Calcutta. Its location is healthful and dry; it is well laid out, and supplied with abundant and good water. There is a large bazaar in Midnapur, in which are the public offices. An excellent training-school has been founded by the American missionaries there, which has been very successful among the natives, and has established village schools in the vicinity. The mission has also a printing-press, from which have been issued some of the earliest and most important works on the Santal language. The chief industries are the manufacture of copper and brass utensils, indigo, and silk. Pop. 33,150.

The *district* of Midnapur is in southwestern Bengal, forming part of the province of Orissa; 5,082 sq.m.; pop. 2,792,950; largest river, the Hooghly.

MIDRASH, *mĭd'răsh* [Heb. *darash*, to search, explain the Scriptures]: general name given to the free exposition of the Old Testament, with the historical legendary, exegetical, didactic, and homiletic comment thereon, which, for about 1,500 years after the Babylonian exile, formed the centre of all mental activity, both in and out of the schools, among the Jews. The work occurs as early as 2 Chron., xiii: 22, although not, perhaps, in its later sense. The prohibitions and ordinances in the Mosaic records, to which a precise meaning was not, in all cases, attached, were, according to certain hermeneutical rules, specified and particularized, and further surrounded by traditional ordinances and inhibitions: Halacha (q.v.) = rule by which to go, or the binding, authoritative, civil, and religious law. The chief codes of this are the Mishna (q.v.), Gemara (q.v.), Sifra (amplification of Leviticus), Sifri (on Numbers and Deuteronomy), and Mechiltha (on a portion of Exodus). Another branch of the Midrash, however, is the Haggada (q.v.), a kind of free poetical homiletics on the whole body of the Old Testament (The Halacha being chiefly confined to the Pentateuch). Haggada was more noticeably ethical and consolatory. The chief collections of that part of the Midrash known as Haggada are Midrash Rabba, A.D. 700-1100 (on Pentateuch and Megilloth), and Pesikta (700), the extracts from which (Jalkut, Pesikta Rabbati, Sutarta, etc.) only are known, the original itself never having been printed. As a whole the Midrash is of great value, inasmuch as a search in its unattractive mass reveals numerous lexical and grammatical hints, and historical, topographical, and chronological notices; also remarkable suggestions in logic, metaphysic, theology, and in ethnography and natural sciences. The history of the Midrash embraces three periods: that of the Soferim (q.v.), the Tannaim (q.v.) and the Amoraim (q.v.), however obscure is the

real date of its origin. It is largely the homiletic literature of the early rabbis, wherein the simple exposition of Scripture is overshadowed by a free and varied interpretation, which illustrates as much the wit and fancy of its authors as the clear meaning of the text. Such homilies made Scripture familiar to masses of the people, as they gathered in the synagogues on Sabbaths and special days, developing not only a class of brilliant preachers, but a love of learning as well, which has been the heritage of Israel. See Dembitz, *Jewish Services in Synagogue and Home* (Phila. 1898); Zunz, *Gottesdien. Vorträge.*

MIDRIFF, n. *mĭd'rĭf* [AS. *hrif*, entrails: Dut. *middelrift*, the diaphragm: OH. *hreve*, the belly]: in *anat.*, the diaphragm; a muscular partition which separates the cavity of the chest from the belly.

MID'SHIPMAN: ninth and lowest grade of officers in the United States navy capable of regular promotion. They must be graduates of the Annapolis naval academy, where they are called 'cadet midshipmen,' until the warrant of midshipman is conferred on them, and they take rank in the navy in the order of merit. After 2 years of actual service at sea, a midshipman, if he can procure a favorable recommendation from his commander, is entitled to an examination for promotion before a board consisting of 3 captains and 2 commanders. Having passed this examination on the practical branches of seamanship, including naval tactics, practical navigation, gunnery, and the steam-engine, he becomes an ensign, and can be promoted to the higher grades of the service. In the British navy, the midshipman is more a naval apprentice under instruction than an actual officer. After 3½ years' service as midshipman, if he passes two qualifying examinations, and is not under 19 years of age, he becomes a sub-lieutenant, and is eligible for promotion to lieutenant and the higher grades.

MIDST, n. *mĭdst* [superl. of MID, which see]: the middle; the very centre: AD. in the middle. IN THE MIDST OF US (colloq.), among us, as neighbors, fellow-citizens, or fellow-countrymen. IN THE MIDST OF, among; involved in; in the thickest of. *Note.*—IN OUR MIDST, IN THEIR MIDST, instead of 'in the midst of us,' 'in the midst of them,' are improper.

MIDWIFE, n. *mĭd'wīf* [AS. *mid*, with, together with; *wif*, woman, wife]: woman who assists women in childbirth. MIDWIFERY, n. *mĭd'wīf-rĭ*, profession of a midwife; art of assisting women in childbirth; obstetrics.

MIDWIFERY: department of medical science which concerns itself with parturition and its allied subjects; also called *Obstetrics* [Lat. *obstetrix*, a woman who stands near, a midwife], and *Tocology* [Gr. *tokos*, childbirth]. For a male practitioner in this line of the medical art, the French name *accoucheur* is used. Midwifery,

as a branch of medical science, is understood to include the study of the anatomy of the parts of the female body concerned; conception and sterility, and the signs and duration of pregnancy; parturition in all its varieties; and the diseases peculiar to the puerperal state. Into the details of a subject so extended and complex, this article does not enter.

In a vast majority of cases the labor in parturition is what is called 'natural'—that is, the child presents itself in the normal position, and unaided nature completes the delivery within 24 hours (usually in less time) with safety to mother and child. Statistics show that about 99 in every 100 are 'natural' labor. 'Unnatural' labor arises either from malformation, disease, or weakness on the part of the mother, or from abnormal conditions of the child; and manual or instrumental aid becomes necessary to prevent the labor from being dangerously prolonged, or—in extreme cases—to render delivery at all possible. Of instrumental applications, by far the most important and frequent is that of the forceps (q.v.), intended not to injure either mother or child. The use of the forceps is necessary in about 1 case in 300; and of these forceps cases about 1 in 21 proves fatal to the mother, while 1 child in 4 is lost. In the operation of craniotomy, the head of the child is intentionally destroyed, with a view to save the life of the mother, the death of both being otherwise inevitable. This operation is not frequently resorted to; it proves fatal on the average to about 1 mother in 5⅓. A more justifiable procedure in such cases is the Cesarian operation (q.v.).

History.—From all the passages in the Scriptures where midwifery is referred to, it is plain that women were the only practitioners of this art among the Hebrews and the Egyptians (see Gen. xxxv: 17; xxxviii: 28; Ex. i: 15-21), and it is equally certain that the Greeks and Romans confided this branch of medicine to women. Phanarete, the mother of Socrates, was a midwife; and Plato explains the functions and mentions the duties undertaken by these women. The Greek and Roman physicians were not ignorant of midwifery, for Hippocrates refers to the necessity of turning the child in certain cases, though his doctrines on this point, as also on the management of the placenta, are not in accord with modern practice; and Celsus, nearly four centuries later, treats of the mechanism of labor with great clearness. A gradual increase in the knowledge of this subject may be traced in the writings of Aëtius, and of Paulus Ægineta, who advocates a resort to craniotomy in certain cases. Rhazes seems to have been the first to advocate the rupture of the membranes, when, by their toughness, they impede labor; and Avicenna gave the first description of an instrument partially resembling the more modern forceps.

At the commencement of the 16th c., Eucharius Rhodion published a little book, which soon acquired celebrity. It was translated from the original High-German into Latin, French, and English, and is remarkable as the first book published on this subject in England. Its title is, *The Byrth of Mankynde, otherwise named the Woman's Book,* by Thomas Raynold, Physician (London 1540), and it contains no external evidence that it is a mere translation. In 1573 Ambrose Paré published a small work, in which he showed that foot-presentations were not dangerous, and that in malpresentations it was better to deliver by the feet than to attempt to bring down the head.

In the early part of the 17th c., the *sage-femme* (midwife) of Marie de Medicis published a collection of observations on midwifery. About this time (probably about 1640), Dr. Paul Chamberlen, English physician, invented the forceps with separate blades, such as is now used. The exact date of this important invention is not known, but 1647 Dr. Peter Chamberlen published a pamphlet entitled *A Voice in Rhama,* in which he speaks of his father's (Dr. Paul Chamberlen) discovery for the saving of infantile life. Hence the forceps must have been invented in the first half of the 17th c. The Chamberlen family (the father and three sons) did not, however, publish their discovery, considering that they had a right to use the secret in the way most to their own advantage; and the exact nature of their instruments was not known till 1815, when the tenant of a house near Maldon, in Essex, England, where Dr. Peter Chamberlen, one of the sons, had resided more than a century previously, accidentally discovered a concealed space, in which were, *inter alia,* a collection of obstetric instruments, including a double-bladed forceps and a vectis, which are now in the possession of the London Medico-Chirurgical Society. Therefore, though Chamberlen's celebrated *arcanum* was doubtless the double-bladed forceps, he seems to have been the inventor also of the vectis or lever. In 1668 Mauriceau's Treatise appeared, which ran through seven editions, and was for a long time the standard work on the subject. He gives a very full account of the process of labor; and his book having been translated into English, 1672, by Hugh Chamberlen, became widely known in Britain. This seems to have been the time when medical men in general began to engage in the practice of midwifery; Harvey, the Chamberlens, and others, taking it up in England; while La Vallière, mistress of Louis XIV., did much to establish the practice in France, by employing Julian Clement, a surgeon of high reputation, in her first confinement 1663.

The last point requiring notice in the history of midwifery in the 17th c. is the discovery of the use of ergot

of rye in accelerating parturition. In 1688 Camerarius stated that midwives in parts of Germany were in the habit of employing it for this purpose; but not till 1774 is further reference found to the use of this drug.

In the early part of the 18th c., different varieties of forceps, closely resembling Chamberlen's instrument, were invented by Giffard, Chapman, and others; Chapman being, as it is believed, the first public teacher of midwifery in London. About the middle of this century lived Sir Richard Manningham, who applied himself to this branch of the profession, and established a small hospital for the reception of parturient women, first of the kind in the British dominions. Midwifery was by this time fully recognized as a branch—though then and long subsequently considered as the lowest branch—of medicine. The names of Smellie, William Hunter, Denman, and Bland in England, and of Astruc and Baudelocque in France, are well known as promoters of various departments of the art of midwifery toward the close of the 18th c. In the 19th c., the art has steadily progressed. Not only are the members of the medical profession compelled to be as well versed in midwifery as in medicine or surgery, but the ignorant midwives of past times are now largely replaced by well-educated nurses, with diplomas, certifying that they have regularly attended lectures on midwifery, and have taken personal charge of a certain number of labors, under superintendence of a qualified teacher.

MIEN, n. *mēn* [F. *mine*, air, look—from It. *mina*, countenance—from mid. L. *minārĕ*, to lead: W. *min*, the lip or mouth: comp. Gael. *mèinn*, expression, the countenance]: the whole external appearance; aspect; air; manner.—Syn.: look; demeanor; countenance; deportment.

MIERIS, *mē'rĭs*, Frans van, the elder: 1635, Apr. 16—1681, Mar. 12; b. Leyden, Holland: Dutch painter. There is some question as to the correctness of the date given for his birth. He received his first instruction from Abr. Toorne Vliet, a famous Dutch designer; afterward studied under Gerard Dow, who called him the prince of his pupils. He applied himself chiefly to genre painting and occasional portraits. His pictures of domestic life are accurate in drawing and rich in color. In the treatment of stuffs and textures, he was superior to Dow himself; his representation of velvet and satin and other rich materials was wonderfully close; while the same accuracy of design, richness of coloring, and exquisite finish distinguish his portraits, the most famous and highly prized of which was his portrait of the wife of Cornelius Plaats. All his pictures are rare and command very high prices. Perhaps the most of them are in the gallery at Florence. He was a man of extravagant habits, and died a prisoner for debt at Leyden.

MIFFLIN, *mĭf′lĭn*, THOMAS: 1744–1800, Jan. 20; b. Philadelphia; of Quaker parentage. He was educated at the Univ. of Pennsylvania; 1765 went to Europe; and on his return entered into business partnership with his brother. In 1772 he began public life as representative from Philadelphia in the colonial assembly; and 1774 was delegate to the first continental congress. He was made maj. in one of the first Philadelphia regiments; and 1775, June, became col., and went to Cambridge with Washington, as his first aide-de-camp. He was rapidly promoted to quartermaster-gen., to adj.gen., and, 1776, May 16, to brig.gen. At the battle of Long Island he rendered distinguished service, covering the army's retreat, and afterward, by his stirring appeals to the people of Penn., raised considerable reinforcements for the continental army prior to the battles of Trenton and Princeton. In 1777 he was made maj.gen., but, becoming dissatisfied, became a prominent member of the famous 'Conway cabal' in opposition to Washington, after the failure of which he resigned his commission. In 1782 he was elected to congress, and 1783 was its pres.; 1785, he became a member and speaker of the Penn. state legislature; 1787, delegate to the national constitutional convention; 1788, succeeded Franklin as president of the supreme executive council of Penn.; 1791–1800 was gov. of the state. He died at Lancaster, Penn.

MIGHT, v. *mīt:* pt. of MAY, which see.

MIGHT, n. *mīt* [Goth. *mahts;* Ger. *macht;* Swiss, *mucht;* Bohem. *moc*, might, power (see MAY)]: strength, force, or power in general; ability. MIGHTY, a. *mīt′ĭ*, strong; powerful; very forcible; very great or eminent; momentous: AD. in very great degree; very. MIGHT′ILY, ad. *-ĭ-lĭ*, powerfully; efficaciously; vehemently; in a great degree. MIGHT′INESS, n. *-nĕs*, power; greatness; title of dignity. MIGHT AND MAIN, utmost effort; highest degree of strength.—SYN. of 'mighty': valiant; impetuous; violent; enormous; bulky; vast; forcible; efficacious; important.

MIGNARD, *mēn-yär′*, PIERRE: 1610–1695; b. Troyes, France. He studied painting first under Simon Vouet; 1630 went to Italy, where in the 22 years of his residence there he became so famous that he was summoned to Paris to paint a portrait of the king. He refused to enter the Academy, and opposed Le Brun, its head, becoming chief of the opposition, which kept him from painting any of the great public works, though his decoration of the cupola of the Val de Grace, 1664, was famous. He applied himself chiefly to portrait-painting, becoming the chief portrait-painter of the century, and nearly all the celebrities of his time sat for him. Le Brun died 1690, and M. succeeded him. Many of his works have been engraved. While about to begin work on the cupola of the Invalides, at Paris, he died.

MIGNET, *mēn-yā'*, FRANÇOIS AUGUSTE ALEXIS: French historian: 1796, May 8—1884, Mar. 24; b. at Aix in Provence. He studied law in his native city together with Thiers, and went to Paris 1821, to enter on a literary life. He found employment in writing for the public journals, and having given lectures on modern history, which were received with great approbation, he was induced to write *Histoire de la Révolution Française* (2 vols. Par. 1824; 10th ed. 1840), in which that great event is regarded less in its moral than its philosophical aspects. It has therefore been reproached with leading to fatalism. His style is brilliant, but academic. After the revolution of 1830, he became a counselor of state, and keeper of the archives of the ministry of foreign affairs; but lost these offices 1848, after which time he lived in retirement. He edited *Négociations relatives à la Succession d'Espagne sous Louis XIV.* (4 vols. Par. 1836–42), to which he prefixed a masterly historic introduction. Among his later works are *Histoire de Marie Stuart* (2 vols. Par. 1851), and *Charles Quint, son Abdication, son Séjour et sa Mort au Monastère de Yuste* (1854); *Eloges Historiques* (1864); and *Rivalité de François I. et de Charles V.* For a *Histoire de la Réforme, de la Ligue et du Règne de Henri IV.*, he is said to have collected hundreds of vols. of manuscript correspondence.

MIGNONETTE, or MIGNONNETTE, n. *mĭn'yŏn-nĕt'* [F. diminutive of *mignon*, darling; *literally*, 'little darling'], (*Reseda odorata*): plant of nat. order *Resedaceæ*, native probably of n. Africa (including Egypt) and of Syria; in universal cultivation for the delicious fragrance of its flowers. It is, according to circumstances and the mode of cultivation, an annual or a perennial, and even half-shrubby plant, with lanceolate entire or trifid leaves, and erect terminal racemes of small whitish flowers, which have the calyx 6-parted and as long as the corolla, the capsules 3-toothed. In the ordinary culture, M. is usually sown in spring, and takes care of itself. It is seen during summer in almost every garden, and during winter in almost every green-house; it is often cultivated in flower-pots in apartments, and perhaps no flower is more common in boxes placed outside of windows in towns. Yet it was introduced into England from Paris 1742 (according to a MS. note in the library of Sir Joseph Banks); and Lord Bateman brought it from the Royal Garden at Paris 1752, when it had not been long known in France. The same year it appears to have been sent from Leyden to Chelsea. It rapidly became a universal favorite throughout Europe, and later in the United States. What is called *Tree M.* is not even a distinct variety, but merely the common kind trained in erect form, and prevented from early flowering by pinching off the ends of the shoots. A handsome double-flowered variety also has been obtained.—Weld (q.v.) belongs to the same genus.

MIGRAINE, n. *mī'grān* [a corruption of *hemicrania*]: the brow-ague; a painful disorder generally on one side of the forehead: see MEGRIM.

MIGRATE, v. *mī'grāt* [L. *migrātus*, removed from one place to another: It. *migrare*]: to remove from one country to settle or reside in another. MI'GRANT, n. *-grănt*, one who or that which migrates, as a migratory bird or animal: ADJ. migrating, migratory. MI'GRATING, imp. MI'GRATORY-CELLS, n. term applied under certain circumstances to the colorless corpuscles of the blood. MI'GRATED, pp. MIGRATION, n. *mī-grā'shŭn* [F.—L.]: the act of removing from one country to another; the instinctive periodical change of abode from one climate to another, common to many species of animals, especially birds. MIGRATORY, a. *mī'grā-tĕr-ĭ*, accustomed to migrate; passing from one climate to another; roving.

MIGRA'TIONS OF ANIMALS: movements of animals in a definite direction, in search of food or (in the case of fishes) of a fit place for spawning; apparently always guided by an instinct operating on all, or nearly all, the individuals of a species. These M. are not to be confounded with the mere diffusion of animals over a more or less extended area, nor with the distribution of species (see GEOGRAPHICAL DISTRIBUTION OF PLANTS AND ANIMALS).

Among mammals, such migrations are comparatively rare. The most remarkable instance is that of the Lemmings, which at no definite epochs, but generally once or twice in a quarter of a century, traverse Nordland and Finmark in vast hosts, ending their career in the Western Ocean, into which they enter, and come to a suicidal end; or, taking a direction through Swedish Lapland, are drowned in the Gulf of Bothnia. M. Martins, member of the great scientific Scandinavian expedition, seems to doubt the generally entertained view of these animals casting themselves into the Western Ocean, and believes that most of them perish from the cold in crossing the rivers, while many are killed by dogs, foxes, and a species of Horned Owl (*Strix brachyotos*), which, in large numbers, always accompanies these emigrations.

According to Gmelin, the Arctic Fox (*Vulpes lagopus*) always accompanies the lemmings in such numbers that, on this ground, it is entitled to be considered a migratory animal; but independently of these special migrations, it is stated by Sir James Ross that 'the young generally migrate to the southward late in the autumn, and collect in vast multitudes on the shores of Hudson's Bay; they return early the following spring to the northward, and seldom again leave the spot they select as a breeding-place.'

The Spring-bok (*Antidorcas Euchore*) is accustomed to make pilgrimages from one spot to another in the vast plains of s. Africa. Herds of many thousands are led

by their chiefs in these migrations, and the wonderful density of the moving mass may be imagined from the fact that a flock of sheep has been inextricably entangled and carried along without possibility of escape. Want of water is said to be the cause of these migrations, but Dr. Livingstone thought that there must be other causes.

The occasional incursions of wolves, in very severe winters, into districts in which they are not commonly found, and the long excursions of large groups of monkeys (*Entellus* and *Rhesus*), hardly fall within the scope of this subject.

Many of the cetacea are probably migratory. 'The migrations of the Porpoise (*Phocœna communis*) appear' —says Marcel de Serres in his prize-essay, *Des Causes des Migrations des divers Animaux*, p. 63—'to be as periodic as those of certain species of birds. During the winter, they constantly proceed from n. to s.; and when they feel the warmth of summer, they turn northward. Thus, they are common in summer in Greenland, while they are rare on our own (French) coasts, where they abound in winter.'

The number of species of birds that periodically migrate is so great that space fails here for a list of them. Marcel de Serres, in the work above quoted, gives a *Tableau de Epoque des Passages des Oiseaux*, which extends over nearly 100 pages: see BIRDS OF PASSAGE. Desire for suitable temperature and search for proper food are the apparent causes stimulating birds to these migrations; and in most instances, especially in the case of insectivorous birds, the food is intimately associated with the temperature.

The migrations of many species of fishes are as remarkable for their regular periodicity as those of birds. In some cases, fishes produced in fresh-water streams migrate to the ocean, and after spending some time in salt water, return (generally, with singular instinct, to their own birthplace) to fresh water to propagate their species. Some of these fishes—e.g., the Lamprey (*Petromyzon marinus*)—spend most of their lives at sea, and others—e.g., the salmon—in fresh water. The remarkable migrations formerly, but erroneously, supposed to be made by herrings, are noticed in the article on that fish. Many fishes of the same family as the herring, the *Clupeidæ*—as, for example, the sprat and pilchard—leave the deep sea for shallow water during the spawning period, when they approach the coasts in vast shoals. All such migrations as these seem due mainly to a reproductive impulse. See FISHES: LAND-CRAB.

Among insects, the Locust (*Locusta migratoria*) is most remarkable for migrations. These insects are probably produced much more abundantly some years than others, and as in such years their birthplace cannot afford them sufficient vegetation, they are led to migrate in search of food. Some idea of the occasional extent of their wanderings may be formed from the fact that, in

the early part of 1810, myriads of locusts appeared in Bengal, whence they proceeded westward, completely across the great Indian peninsula, to Guzerat and the neighboring provinces, whence they pursued their course southward toward Bombay, the whole period of their migration extending over between two and three years; while, in relation to their numbers, Capt. Beaufort calculated a swarm that appeared at Sardis, in Asia Minor, 1811, at more than 168,000,000,000,000.

MIGUEL, *me-ghĕl'*, Dom MARIA EVARIST (known usually as DON MIGUEL): pretender to the throne of Portugal: 1802, Oct. 26—1866, Nov. 14; b. Lisbon; third son of John VI. of Portugal, and uncle of Dom Pedro II., lately emperor of Brazil. He spent his early years in Brazil, unrestrained and uneducated. When he returned with the royal family to Portugal 1821, he could neither read nor write, and showed no talent for anything but fencing. He joined his mother, Charlotte Joachime of Spain, in her plots for the overthrow of the constitution and the establishment of a despotic govt.; part of the scheme being, that his weak father should be either formally deposed, or virtually deprived of power. The aged Marquis of Loulé, faithful servant of the king, having been removed by assassination, M., as Infant-generalissimo, caused the ministers to be arrested, 1824, Apr. 30, and his father to be closely watched in his palace; but the plot failed, and M. and his mother were banished. He led for some time a remarkably wild and profligate life in foreign countries. After the death of his father 1826, the queen's party set forth a claim to the throne on his behalf, as his elder brother, Dom Pedro I., was emperor of Brazil; and 1826, May 2, Pedro resigned the crown of Portugal in favor of his eldest daughter, Donna Maria da Gloria, proposing that her uncle M. should be her husband. and regent of the kingdom till her majority; to all of which M. agreed. But Queen Joachime's party had everything prepared for the restoration of absolutism. M. was declared king of Portugal. War ensued, and at first M. was victorious. He carried into full effect the principles of his party by a system of most severe repression of liberalism, and signalized himself by extreme tyranny of every kind, while his own life was one of wildest excess. In 1832 Dom Pedro took Oporto, and, his arms gradually prevailing, M. was obliged to sign a capitulation at Evora, 1834, May 26, by which he resigned all claim to the throne of Portugal, and agreed to retire altogether from the country. But scarcely had he been conveyed to Genoa, when he protested against this deed, and consequently all his estates in Portugal were confiscated, and an annual pension which had been secured to him was stopped. He went to Rome, where the papal govt. acknowledged him as rightful king of Portugal, but with no result. Latterly he lived at the castle of Bronnbach, in Baden, where he died.

MIHRAB, n. *mē′răb* [Arab. a praying place]: ornamental recess or alcove in the centre of the exterior wall of a mosque, having the mimbar or pulpit to the right. It always marks the direction of Mecca, and the people pray in front of it. In it a copy of the Koran is kept. A similar place is found in Jewish synagogues, pointing toward Jerusalem, and containing a copy of the Law.

MIKADO, n. *mī-kā′dō:* common title of the emperor of Japan. The term, said to mean honorable gate, or grand place, was formerly applied to the palace of the sovereign, but for a long period has been used to designate the official head of the nation. The M. claims to have descended from the divine beings who created the world. He has no family name, does not take that of any previous M., and the name by which he is known in history is selected after his death. He can have one wife and 12 concubines, and there are four imperial families from either of which a child may be selected for adoption by the M., and thus be brought into the line of succession. The first M. began to reign about B.C. 660; and 123 rulers, of whom 11 were females, have occupied the throne; and it is claimed that during the 2,500 years the line of descent has been unbroken. The present M., MUTSUHITO (q.v.), b. 1852, was crowned 1868. He at once abandoned the ancient policy of seclusion, received representatives of various Christian nations, and in 1869 removed his residence to Yedo, changing its name to Tokio. See JAPAN—*Government, History.*

MIKANIA, *mĭ-kā′nĭ-a:* genus of plants of nat. order *Compositæ*, nearly allied to *Eupatorium* (q.v.). The heads of flowers are 4-flowered, and have four involucral leaves. *M. officinalis* is a Brazilian species, with erect stem and heart-shaped leaves, abounding in a bitter principle and an aromatic oil, and valuable as a tonic and febrifuge. *M. Guaco* and *M. opifera*, also natives of warm parts of S. America, are among the plants which have high reputation—deserved or undeserved—for the cure of snake bites. They are twining herbaceous plants. *M. Guaco* is remarkable for large indigo-blue spots on the under side of its ovate leaves. The mode of using this plant, which is one of those called GUACO, or HUACO, by the Indians, is by dropping the juice of the fresh leaves into the wound made by a serpent; or little cakes are formed of the bruised plants, which are said to retain their power a long time. The subject requires investigation.

MIKLOSICH, *mĭk′lo-shĭch*, FRANZ: Slavist, most eminent for learning: b. 1813, Nov. 20, at Luttenberg; d. 1891. After studying law at the Univ. of Grätz, he went 1838 to Vienna to practice as advocate; but 1844 obtained a situation in the Imperial Library; 1850 was appointed professor of Slavic in Vienna. Among his principal works are: *Radices Linguæ Palæoslovenicæ* (Leip. 1845): *Lexicon Linguæ Palæoslovenicæ* (Vienna 1850); *Vergleichende Grammatik der Slaw, Sprachen*

(4 vols. 1852–74), a work which has done for Slavic what Grimm and Diez have done for the German and the Romance languages. Other works are *Die Bildung der Slaw. Personennamen* (1860), and *Die Zigeuner Europa's* (1872–78).

MIKLOS (ST.) TOROK, *sĕnt mē-klŏsh' to-rŏk':* town of Hungary, county of Heves, near the Theiss, about 70 m. s.e. of Pesth, with which it is connected by railway. The people are employed chiefly in rearing horses and cattle, and in fishing. Pop. over 16,000.

MIKNAS, *mĭk'nas*, or MEQUINEZ, *mĕk'e-nĕz*, or MEKNAZA: town in the province of Fez, in Morocco, 38 m. w. by s. from the town of Fez; in a fertile valley near the Sebu. It is surrounded by triple walls and a moat; is neat and well built, and contains the finest imperial palace in Morocco. This vast pile, erected by the Sultan Muley Ismail, is of marble, and the surrounding grounds are laid out in gardens, said to be the most beautiful in Morocco. M. is the summer residence of the sultan. There is an extensive trade in native produce. The chief manufactures are of painted earthenware and leather. Pop. unknown, as estimates vary from 15,000—55,000.

MILAN, *mĭl'an:* province of Italy, in w. part of Lombardy; bounded n. by Como, e. by Bergamo, s. by Cremona and Pavia, w. by Pavia and Novara; 1,155 sq. m. The surface is hilly in the n., with level plains in the s. The soil is fertile, though low and marshy along the Ticino river, which separates it from Piedmont on the n., and the Addio, Lambro, Olona, and other branches of the Po which drain the country. Railroads traverse it to Venice, Como, Parma, and Turin. Monza, on the Lambro river, 10 m. n.e. of Milan, is, besides Milan, the only considerable town, having about 20,000 inhabitants and a famous old cathedral. The portraits of all the Lombard sovereigns are preserved in this town. The surface of the province is kept very productive by being intersected with many canals for irrigating purposes; it affords fine pasturage for superior cattle, and produces fruit, corn, rice, silk, etc. The province has many flourishing villages, hamlets, farms, and country residences. It is divided into 5 districts now; under Austrian dominion it had 15, with an area of only 746 sq. m. The present districts are Abbiategrasso, Gallarate, Lodi, Milan, and Monza. Pop. (1891) 1,114,991; (1901) 1,442,179.

MIL'AN (Ital. *Milano*): second in size of Italian cities (after Naples and before Rome); cap. of the province of M.; 25 m. s. of the Alps at Como; 390 ft. above sea-level, on the river Olona, in the centre of the great plain of Lombardy. Pop. (1871) city 199,009; commune 261,985; (1881) city 214,004; with suburbs 295,543; (1901) commune 491,460. Being on the line of the chief routes of the central Alps, it derives great commercial advantages, while its fine canal-system opens for it communication with the principal rivers of Italy. The *Naviglio Grande*, or Grand Canal, connects M. with the Ticino, and

THE CATHEDRAL OF MILAN.

the Martesana canal with the Adda. The city, almost circular, is encompassed on three sides by walls and low ramparts; it has a circuit of about 7¾ m., and is entered by 10 gates. Notwithstanding its great antiquity, M. possesses but few remains of its early splendid structures, in consequence of the many calamitous wars by which it has been ravaged. Modern M. is one of the most opulent and populous cities of Italy; its best streets are regular, wide, and well paved, and kept with scrupulous care; the dwellings are commodious and tasteful, though of less imposing character than the great feudal Tuscan houses. M. abounds in churches worthy of note: of these, the principal is the famous Gothic cathedral, the *Duomo*, which, with the exception of St. Peter's in Rome, is the most magnificent ecclesiastical structure of Italy. It has a façade of white Carrara marble, and is adorned by 106 pinnacles and 4,500 statues, besides a variety of carvings of unsurpassable beauty. In form, it is a Latin cross, length 485 ft., breadth 252 ft. The height of the dome is 355 ft. Its foundation was laid 1386 by Gian Galeazzo Visconti, and during its erection many of the greatest European architects contributed designs for its embellishment. Within it, Napoleon was crowned king of Italy 1805. The Church of St. Ambrose (founded, 4th c., by Ambrose [q.v.] great Bp. of M.) is the most ancient in M., containing inscriptions, sarcophagi, and monuments full of antiquarian interest: it is the church in which the German emperors were crowned kings of Italy. The Dominican Church of *Santa Maria delle Grazie* contains in its refectory the famous *Cenacolo*, or *Last Supper*, by Leonardo da Vinci. The Church of San Carlo Borromeo (1847) is notable; and the Church of St. Nazaro possesses several masterpieces of the best schools of Italian art. There is also the Church of St. Sebastiano, anciently a Roman temple.

Among secular buildings, the most noteworthy is the magnificent Brera Palace, formerly a Jesuit college, now used for public schools of the fine arts, with the official name Palace of Arts and Sciences. Within its vast precincts, this unique institution includes an acad. of art, a choice gallery of paintings of the Bolognese and Lombard schools, a fine collection of casts for modelling, a splendid public library of 140,000 vols., and a rare collection of manuscripts, medals, and antiquities: attached to it are an observatory and a botanical garden. Besides the Ambrosian (q.v.), there are several large private libraries. Among scientific and artistic institutions of M. are the museum of natural history, the schools of surgery and medicine, especially that of veterinary practice, the celebrated Conservatory, or school of music, and a military geographical institute, well known for the excellence of the maps that it has issued. The educational establishments include four gymnasia, besides normal schools, technical schools, conventual schools, and a seminary. The charitable institutions are numerous and splendidly endowed, having an aggregate property of

more than $35,000,000; the *Ospedale Maggiore*, or Great Hospital, founded by the ducal house of Sforza 1456, accommodates 2,000 patients, and annually admits more than 20,000. The Trivulzi Hospital, endowed by the Trivulzio family, maintains and clothes 600 aged pensioners. The Milanese places of amusement are on as grand a scale as the other public buildings of the city; the first in point of celebrity being the theatre *La Scala*, which can accommodate 3,600 spectators. The *Corso*, or chief street of M., is the universal fashionable promenade; and the famous arcade, or *Galleria di Cristoforis*, with its brilliant shops and cafés, is also a favorite place of evening resort, and on account of its gay appearance has been called 'Little Paris.' M. has immense inland trade in silk, grain, rice, and cheese; and has considerable manufactures of silk goods, ribbons, cutlery, and porcelain.

M. (Lat. *Mediolanum*) was originally a town or village of the Insubrian Gauls. It was conquered by the Romans B.C. 222, received the Latin franchise about B.C. 89, and the full Roman franchise B.C. 49. Under the Romans it became a conspicuous centre of wealth and civic influence; its citizens were noted for refined manners and literary tastes, and the public buildings for beauty and elegance. In the beginning of the 4th c., it was selected as the residence of the imperial court by Maximian. M. was sacked by the Huns (under Attila) 452, by the Goths (under the brother of Vitiges) 539, and passed to the Longobards and Franks previous to its subjection by the German empire. After 961, it was long governed by dukes in the name of the emperors. The feuds of the Guelphs and Ghibellines distracted M., like all the other Italian cities. Supreme power became eventually vested in the Ghibelline Visconti, by whom the ascendency of M. was extended over the whole of Lombardy. 1535–1714 M. was a dependency of the Spanish crown; from the close of the war of the Spanish succession (1714) till the Napoleonic campaign of 1796, it was under Austria. Under Bonaparte, it was declared the cap. of the Cisalpine Republic, of the Italian Republic, and, finally, of the Kingdom of Italy. In 1815 M. was restored to Austria, and continued the cap. of the Austro-Italian kingdom until the Lombard campaign, with the battles of Solferino and Magenta, and the resulting annexation of Lombardy to Piedmont, 1859, by the peace of Villafranca, which made it a part of the kingdom of Italy: see ITALY.

In religion, the Milanese, by the force of circumstances, early developed a spirit of independence and a tendency to act and judge for themselves, which has led them at various periods to contest the extreme claims of the Roman see. The ritual of their bp. Ambrose is still in use; and it is reported that a strong party of the clergy in M. now incline to a reformed Catholicism, the use of the vernacular in the service, the marriage of priests, election of priests by the parishes, and similar reforms.

MILAN, *mē-lân′*, I., OBRENOVITCH, ex-King of Servia: b. 1854, Aug. 10, at Jassy. He was adopted by his cousin, Prince Michael, and was educated at Paris. On the assassination of Michael (1868), he became prince, but the govt. was in the hands of a regency until 1872, when the prince attained his majority and assumed control of state affairs. He married (1875) the princess of Stourdza, from whom he has been divorced. He became involved (1876) in war with Turkey, and 1878 secured the recognition of Servia as an independent state by the Treaty of Berlin. On the establishment of Servia as a kingdom (1882), he took the title Milan I. An attempt to assassinate him in October of that year failed. Troubles with the queen led to his abdication in favor of his son Alexander, 1889, March 6. He died 1901, Feb. 11.

MILAZZO, *mē-lât′sō* (anc. *Mylæ*): fortified sea-port on the n. coast of the island of Sicily, 18 m. w. of Messina. Its situation is unhealthful. The chief exports are tunny, wine, silk, fruits, corn, oil, and liqueurs. The town is irregularly built, and is considered almost impregnable, owing to the great natural strength of its position and the extent of its military works and citadel. Garibaldi, with 2,500 men, defeated 7,000 Neapolitans here 1860, July 20, and compelled the garrison to evacuate the fortress.—Pop. about 8,000.

MILBURN, *mĭl′bẽrn*, WILLIAM HENRY (widely known as 'the blind preacher'): b. Philadelphia, 1823, Sep. 26. He became nearly blind in early life, but obtained an education at Illinois College. He entered the Meth. ministry 1843 as an itinerant preacher, and while serving in this capacity travelled 200,000 m. He was also located for a while at Montgomery and Mobile, Ala., where he was a successful pastor. He became noted as an eloquent preacher and lecturer; was chaplain of the house of representatives at Washington 1856, and three years later made a successful lecturing tour in England. On his return to this country, he was ordained in the Prot. Episc. Church, but became again a Methodist 1872. He was chaplain of the house of representatives 1885-93, then of the Senate till his death. His published works include *Rifle, Axe, and Saddle-bags; Ten Years of Preacher Life; Pioneers, Preachers and People of the Mississippi Valley.* He died 1903, April 10.

MILCH, a. *mĭlch* [Ger. *milch*, milk; *milken*, to milk: Icel. *milkr*, milk-giving: Gr. *amelgo*, I milk: Lith. *milzu*, to stroke, to milk a cow]: giving milk, as cows or goats; in *OE.*, soft; merciful; sweet. *Note.*—In connection with OE. meaning, a suggested derivation is Gael. *milis*, sweet: *milsead*, sweetness, softness.

MILD, a. *mīld* [Ger. *mild*, soft; Icel. *mildr*, lenient; *milda*, to soothe: AS. *mild*, merciful]: soft, smooth, or gentle; affecting the senses gently and agreeably; acting or operating gently; not stern, rough, or angry; not acrid; sweet and mellow; not sharp. MILD′LY, ad. *lĭ*, in a mild manner; tenderly; not severely. MILD′-

NESS, n. *-nĕs*, quality of being mild; softness; tenderness; gentleness of operation; pleasant condition.—SYN. of 'mild': meek; bland; good; tame; tranquil; calm; merciful; kind; placid; compassionate; clement; indulgent; tender; soothing; demulcent; softening; lenitive; mollifying; assuasive; moderate.

MILDEW, n. *mĭl'dū* [Ger. *mehlthau*, meal-dew; OHG. *militou*, rust on corn: comp. Gael. *mill-cheo*, mildew—from *mil*, to injure; *ceo*, a mist]: a disease which attacks plants; rust; blight; moldiness; spots of mold caused by moisture, on linen, paper, etc. M. is a term vaguely applied to certain diseased states of plants caused or characterized by the growth of small parasitical fungi; also to spots on cloth, paper, etc., and even on the surface of glass and other inorganic substances, produced by growth of minute fungi. The M. fungi are numerous, and the name M. is often given to many that are known also by other names, as BLIGHT: BRAND: BUNT: RUST: ETC. (see these titles; also BOTRYTIS: OIDIUM). Different species or families of plants have their own peculiar parasites; several kinds of parasitic fungus, however, are often known to infest one plant. Probably the name M. belonged originally to those molds which form white mealy patches on leaves. Some of these are of the genus *Erysiphe*, which exhibits fleshy, somewhat gelatinous masses, becoming globose *sporangia*, filled with spore-containing *asci*, and surrounded by a flocky *mycelium*, often spreading widely over the leaves and other parts of plants. Maples are sometimes covered with a M. of this kind, so as to be quite hoary. Similar mildews are often seen on pease and other leguminous plants; also on umbelliferous plants. Sulphur has been found a cure in some of these cases.—Many of the most destructive mildews are of red or brown color, as the M. of the pear, *Aecidium cancellatum*, that of the barberry, *Aecidium Berberidis*, etc.; while some are almost black, as the corn M., *Puccinia graminis*, by which the crops in some years are greatly injured. Whether M. is the consequence of unfavorable weather and of fungi attacking an already weakened plant, or is the consequence of infection by spores of fungi brought through the air or soil to a plant previously healthy, is not ascertained; probably sometimes the one may be the case, sometimes the other. There is no doubt that many kinds of M. appear chiefly toward the close of summer on leaves in which vegetable life has already mostly lost its power. MILDEW, v. to taint with mildew. MIL'DEWING, imp. MILDEWED, pp. *mĭl'dūd:* ADJ. affected with mildew. *Note.*—From the facts that *mildew* is generally found in the form of a dark or black smut, and that all kinds of it are produced by parasitic fungi, a connection is indicated with the Gael. *mial-dhu*, black aphides, or lice, upon plants—from *mial*, a tick or aphis, and *dhu*, black. Doubtless the similarity of the first syllable suggested a connection with L. *mel*, honey, and the transference to some kinds of *mildew* of a whitish appearance, of the popular term *honey-dew*.

MILE, n. *mīl* [F. *mille*, a mile—from L. *millĭă*, a thousand: L. *mille passŭŭm*, a thousand paces, a mile]: largest terrestrial measure of length in common use among the British and most of the European nations, and in the United States: in Britain and the United States it is 1,760 yards of 3 ft. each, = 5,280 ft. The term is derived from the Roman *milliare*, which contained 1,000 paces of 5 Roman ft. each, the pace being the average length of the step made by the human foot. The Roman foot being accounted as between 11·65 and 11·62 English inches, the Roman M. was thus less than the present English M. by from 142 to 144 yards; thus the Roman M. measured from 4,848–4,854 ft. English.—The length of the modern M. in different countries shows unaccountable diversity. Before the time of Elizabeth, scientific writers made use of a M. of 5,000 English ft., from the notion that this was the Roman M., forgetting the difference in value between the English and Roman foot. The present English M. is known as the 'English statute M.,' because it was incidentally defined by an act passed in the 35th year of the reign of Elizabeth to be '8 furlongs of 40 perches of 16½ ft. each'—i.e., 1,760 yards of 3 ft. each; and it has since retained this value. The *geographical* or *nautical mile* is the 60th part of a degree of the equator (it is stated approximately at 69$\frac{1}{10}$ English statute miles; but see DEGREE OF LATITUDE), and is employed by the mariners of all nations; but in Germany the geographical M. denotes $\frac{1}{15}$ part of a degree of the equator, or 4 nautical miles. The following table gives the length, in English statute miles, of the various miles that have been or are commonly used:

	Eng. Miles.
English geographical mile,	= 1·153
German geographical mile,	= 4·611
Tuscan mile,	= 1·027
Ancient Scotch mile,	= 1·127
" Irish mile,	= 1·273
German short mile,	= 3·897
Prussian mile,	= 4·680
Danish mile,	= 4·684
Hungarian mile,	= 5·178
Swiss mile,	= 5·201
German long mile,	= 5·753
Hanoverian mile,	= 6·568
Swedish mile,	= 6·648
The French kilomètre,	= 0·621

and 29 kil. = 18 English statute miles nearly.

MILEAGE, n. *mīl'ăj:* fares paid for travelling by the mile in a conveyance. MILEPOST, or MILESTONE, post, stone, or other mark placed on a roadside to indicate the distance in miles of a traveller from a town or central place.

MILES, *mīlz*, NELSON APPLETON: b. 1839, Aug. 8, Wachusettville, Mass. He studied at an acad. and afterward obtained a position as salesman in a Boston store. He entered the army 1861, Sep. 9, as lieut. 22d Mass. vols., and was wounded in the battles of Fair Oaks, Mal-

vern Hill, and Chancellorsville. In 1862 he became col. of the 61st N. Y. vols., and 1864, May 12, he was appointed brig.gen. vols., being with one exception the youngest man who had attained this rank in the army. He was prominent in the Richmond campaign 1864, and was brevetted maj.gen. In 1866 he was col. of the 40th U. S. infantry, but was transferred to the 5th infantry 1869. In 1867 he was brevetted brig.gen. and maj.gen. vols., and commissioned brig.gen. in the regular army 1880, Dec. 15. For brilliant services in subduing hostile Indians on the frontier, he has received the thanks of several state and territorial legislatures, honorable mention in a message to congress by Pres. Cleveland, and an elegant sword presented by the people of Arizona, 1887; promoted maj-gen. 1890; led the American expedition for the conquest of Porto Rico 1898; promoted lieut.-gen. 1900 and 1901; retired 1903, Aug. 8.

MILESIAN, n. *mĭ-lē'zhĭ-ăn:* a native or inhabitant of *Milētus*, an anc. city of Asia Minor. The term is applied also to natives of Ireland, descended, according to the legend, from *Milesiŭs of Spain* (see FIRBOLGS).

MILETUS, *mī-lē'tŭs:* anciently, greatest and most flourishing city of Ionia, in Asia Minor. It was at the mouth of the Mæander, and was famous for woolen manufactures and extensive trade with the north. Before being forcibly colonized by the Ionians, it appears to have been inhabited by Carians. M. early founded a number of colonies on the Black Sea and in the Crimea, possessed a fleet, which sailed to every part of the Mediterranean, and even ventured into the Atlantic, and maintained long and expensive wars with the Lydian kings. Before the middle of B.C. 7th c., M. had founded more than 60 cities along the Hellespont, the Propontis, and Black Sea coast. The 'Milesians' were believed to be the purest representatives of the Ionians in Asia. After the conquest of Lydia by the elder Cyrus, it was subdued, with the whole of Ionia. It continued, however, to flourish till it was excited to rebellion against the Persians in the Ionian war, and was destroyed B.C. 494. It was rebuilt, but never regained its former importance. Its harbor gradually silted up, and the site of M. is now a marsh. M. has an honorable place in the history of Greek literature, being the birthplace of the philosophers Thales, Anaximander, and Anaximenes, and of the historians Cadmus and Hecatæus.

MILFOIL, n. *mĭl'foyl* [F. *mille*, a thousand: OF. *fuil* or *foil*, a leaf—from L. *millĕ*, a thousand; *folĭŭm*, a leaf]: the herb yarrow, found growing on roadsides, having small white flowers and numerous narrow pointed leaves; *Achillēă millĕfōlĭŭm*, ord. *Compositæ*.

MILFORD, *mĭl'ford:* town in New Haven co., Conn.; on Long Island sound; about 11 m. s.w. of New Haven; on the New York New Haven and Hartford r.r., with a station at the junction of this r.r. with Naugatuck r.r. It was settled 1639, Nov., and originally organized as a

kind of free ecclesiastical republic, the site having been purchased from the Indians. M. has good public schools, a newspaper, bank, several hotels, and several churches. Its chief manufactures are straw goods, boots and shoes, silverware, electrical and telephone supplies, and carriages. Pop. (1900) 3,783.

MIL'FORD, town in Worcester co., Mass.; 18 m. s.e. of Worcester; on the Charles river and on the New York, New Haven and Hartford and the Boston and Albany railroads. It has a town-house, high school, public and parish schools, public library, banks, weekly newspaper, churches, and was formerly one of the largest boot and shoe manufacturing towns in New England. It still has large boot and shoe factories, machine-shops, tanneries, and manufactories of straw goods, silk and thread and bone cutters. Pop. (1890) 8,780; (1900) 11,376.

MILFORD, town in Hillsboro co., N. H., on Souhegan river, and on the Boston & M. and the Fitchburg R.R.'s; about 27 m. south by west from Concord, and 15 m. s.w. of Manchester. The chief industries are connected with manufacturing, quarrying granite, lumbering and agriculture. The principal manufactures are flour, leather, lumber, piano keys, harnesses, furniture, quarry machinery, soap, paper boxes, wagons and carriages, and dairy products. Pop. (1900) 3,739.

MIL'FORD: town in Pike co., Penn.; on the Delaware river, and the Erie railroad; 8 m. s.w. of Port Jervis, 97 m. n.w. of New York. It is in the most picturesque part of the Delaware valley, on a broad plateau 400 ft. above tide-water terminating in an abrupt bluff, with a semicircular range of mountains rising above the town on the n.w. and s. About 1 m. from M. are the Sawkill Falls and the Cliffs; 3 m. below are the Falls of the Raymondskill; and 13 m. below are the cataracts on the Big and Little Bushkill creeks. M. was laid out 1800; has been a popular place for summer rest for many years; contains several ante-revolutionary buildings; and has numerous hotels, private boarding-houses, churches, graded school, acad., etc. Pop. (1900) 884. Summer pop. about 7,500.

MILFORD, *mil'ford:* parliamentary borough (contributory to Pembroke) and sea-port of S. Wales, county of Pembroke, on the n. shore of Milford Haven, 7 m. e.n.e. of St. Ann's Head. The haven is a land-locked estuary running inland 17 m. to Langwin (which is easily reached by vessels of 2,000 tons), and 1 to 2 m. in breadth. It is protected from winds by a girdle of undulating hills, is deep (15 to 19 fathoms in most parts, with spring-tides rising 25 ft.) and easy of access. The excellence of the haven has been recognized from the earliest times; but the rise of the town of M. may be said to have begun with the 19th c., when docks and quays, with a mail packet-station for Ireland, a dock-yard, ship-building slips, and an arsenal

were established here, only, however, to be removed in 1814. Since that time, with only occasional gleams of prosperity, M. has been in a declining condition; but the opening of the M. railway, and the construction of docks and wharves, have given a new impetus. New docks, capable of accommodating vessels of the largest tonnage, were completed 1882. The new available dock area is 60 acres, and commercial prosperity is now looked for. Pop. 5,100.

MILHAU, or MILLAU, *mē-yō':* town of France, department of Aveyron, in a rich and fertile dale on the right bank of the Tarn, 55 m. n.w. of Montpelier. During the 16th and 17th c., it was one of the strongholds of the Calvinists. Leather and gloves are manufactured, and there is a good trade in wool, timber, hides, cheese, and wine. Pop. about 16,000.

MILIARY, a. *mĭl'ĭ-ă-rĭ* [F. *miliaire,* miliary—from L. *miliāriă,* a weed destructive to millet—from *milĭŭm,* a kind of small grain called millet]: in *med.,* miliary fever is an eruptive fever accompanied with innumerable white pimples resembling millet-seeds. MILIARY GLANDS, the sebaceous glands of the skin.

MILICZ, *mē'lĭch* (or MILITSCH) OF KREMSIER: religious reformer: about 1325—1374, June 29; b. near Olmütz, Moravia. He was in official service of the church 1350, and 1360 was canon of the cathedral at Prague, archdeacon, and connected with the court of the emperor. In 1363 he surrendered his offices, but continued preaching to the students in Latin and to the poor in their native tongue. His street preaching was wonderfully successful. In 1367 he made a fruitless visit to Rome to present to Urban V. his views concerning evils and abuses within the church. He returned to Prague, where he preached until he was summoned, to answer charges, to the papal court at Avignon, where he died before his case came to trial.

MILIOLA, n. *mĭl'ĭ-ō'lă* [L. *milĭŭm,* millet]: in *geol.,* a genus of minute foraminiferous shells—so called from their resemblance to millet-seed—occurring in myriads in certain strata. MILIOLITE, n. *mĭl'ĭ-ō-līt* [Gr. *lithos,* a stone]: a fossil shell of the genus *miliola.* MIL'IOLIT'IC, a. *-lĭt'ĭk,* or MIL'IOLITE, a. *-līt,* of or pertaining to or containing miliolites. MILIOLITE LIMESTONE, a building stone, one of the group of the Paris basin, almost entirely made up of these microscopic shells.

MILITANCY, n. *mĭl'ĭ-tăn-sĭ* [see MILITANT]: in *sociology,* social condition of a nation or tribe ideally organized for war. In such a state of society the tendency is for the body of warriors to bear the largest practicable ratio to the body of workers; individuality becomes merged in the community; despotism and centralization ensue, and a process of regimentation goes on even in civil life; freedom of movement from place to

place is restricted; state organizations take the place of private combinations; and such a society usually evolves, or endeavors to evolve, a self-sufficient sustaining organization, drawing, as much as possible, all supplies from its own resources.

MILITANT, a. *mĭl'ĭ-tănt* [L. *milĭtans* or *milĭtan'tem*, serving as a soldier; *milĭtātus*, served as a soldier—from L. *mīlĕs;* It. *milite*, a soldier]: serving as a soldier; fighting; engaged in warfare. THE CHURCH MILITANT, the Christian Church on earth, as engaged in constant warfare against her enemies—*church triumphant*, the Christian Church in heaven. MILITARY, a. *mĭl'ĭ-tĕr-ĭ* [F. *militaire*—from L. *milĭtāris*, of or belonging to a soldier]: pertaining to soldiery or to arms; engaged as a soldier; derived from services or exploits of a soldier; warlike; martial: N. the soldiery; the army. MILITARISM, n. *mĭl'ĭ-tĕr-ĭzm*, that state or condition of a country in which government by force or the sword is predominant, in contradistinction to a popular and constitutional government. MILITATE, v. *mĭl'ĭ-tāt*, to operate unfavorably; to act in opposition, followed by *against*. MIL'ITATING, imp. MIL'ITATED, pp. MILITIA, n. *mĭ-lĭsh'ă* [L. *milĭtĭă*, warfare]: citizens embodied and trained as soldiers, liable to serve for the internal defense of a country; a body of men trained and disciplined in military tactics, but not regular soldiers (see MILITIA, below). MILI'TIAMAN n. *-ă-măn*, one who serves in the militia; one not a regular soldier.

MILITARY ACADEMY, ROYAL: establishment at Woolwich, England, through which must pass all candidates for the Royal Artillery and Royal Engineers. The age for entrance is 17 years, and the vacancies are open to public competition. The pupils are denominated military cadets, and the parents or guardians have to make a considerable payment in regard to each, so long as they remain at the academy; the annual charge for the son of a civilian being £120, that for the son of a naval or military officer less, according to rank of the father. When the term of instruction—which comprises a thorough general education, with the higher mathematics, fortification, gunnery, and military duty—is completed, the cadets compete for the vacancies in the engineers and artillery, those who pass the best examination being allowed to select the former corps. Those who obtain commissions in the engineers proceed to Chatham for further instruction (with military pay, however) in their professional functions. The artillery cadets at once join the Royal Artillery as lieutenants.

MILITARY ACADEMY, UNITED STATES. See UNITED STATES MILITARY ACADEMY.

MILITARY LAW: a term which applies to and includes such rules of action and conduct as are imposed by a state upon persons in its military service, with a

view to the establishment and maintenance of military discipline. It is largely, but not exclusively, statutory in character, and prescribes the rights of, and imposes duties and obligations upon, the several classes of persons composing its military establishment; it creates military tribunals, endows them with appropriate jurisdiction and regulates their procedure; it also defines military offenses and by the imposition of adequate penalties, endeavors to prevent their occurrence.

Distinction Between Military and Martial Law.—It is proper to observe, at this point, that the terms *military law* and *martial law,* though frequently confused, are by no means synonymous. Military law is in great part statutory in character and regulates the conduct of military persons at all times and in all places, without as well as within the territorial jurisdiction of the United States; that is, military law is applicable to certain persons, not only in time of peace, but in time of war as well, and its operation is not restricted to the territory of the United States, but follows its forces wherever they may go in the performance of lawful military duty or in the prosecution of a legitimate and duly authorized military undertaking. The Naval Articles of War, for example, do not cease to be binding upon the officers and men who constitute the crew of a vessel of war, when they pass from the territory of the United States into the high seas; indeed, by the comity of nations, those laws continue to be operative while such vessel is in the territorial waters of a foreign state. So, too, the Articles of War continue in force and have extraterritorial operation when any portion of the constitutional military forces enters foreign territory in the prosecution of a war lawfully declared by the congress. The military laws of the United States had the same binding force in the armies of Generals Scott and Taylor while operating in Mexico that they had in respect to those portions of the army which remained within its territorial jurisdiction during that period. Military law has, also, chiefly to do with the acts and relations of military persons; it applies to the conduct of citizens in an exceedingly limited number of cases, in each of which there must be the express authority of an enactment of congress.

Martial law, on the other hand, is not statutory in character, and arises, in every case, out of strict military necessity. Its proclamation, or establishment, is not expressly authorized by any of the provisions of the constitution; it comes into being, as will hereafter be seen, only in the territory of an enemy in time of war, or in a part of the territory of the United States in which the proper civil authority is, for some controlling reason, unable for the time to exercise its proper functions. In the former case it is known as *military rule* or the *law of military occupation* and, as such forms a part

of the law of nations. It disappears when such forcible resistance to the operation of the law has been overcome, or has ceased to exist, and the civil authorities have been enabled to resume the exercise of their appropriate functions.

Other Sources of Military Law.—While military law is in great part statutory, it is the function of the higher civil courts to interpret the statutes enacted by the congress, and to apply them to cases arising in connection with their execution: and the decisions of such courts are of equal authority with the statutes upon which they are based. Among other forms of written military law may also be mentioned the decisions of the president and secretary of war in military matters; the opinions of the attorney-general and of the judge-advocate general: the general regulations of the army and the general orders of the war department. There is also a body of well established usages known among military men as 'customs of war,' which correspond, in binding force, to customs at common law.

Courts-martial.—Military law is enforced by means of certain tribunals, created for the purpose, called courts-martial. These tribunals are created by the order of a proper convening authority, and are empowered by statute, to determine challenges, to try accusations against military persons, to reach findings of guilt or innocence respecting the same, and to impose appropriate sentences. Their sentences, however, have no legal validity, being in the nature of recommendations merely, until they have received the approval of a military commander, designated by law for this purpose, called the *reviewing authority.* With such approval or confirmation, however, their sentences become operative and acquire the same sanction as the sentences of civil courts having criminal jurisdiction, and are entitled to the same legal consideration. Courts-martial are classified, in accordance with their jurisdiction, into *General* and *Inferior Courts-martial;* the latter term including the regimental and garrison court-martial, and the summary court. The general court-martial is the highest tribunal known to military law, and has the most comprehensive jurisdiction in respect to both persons and cases. It may try any person subject to military law for any offense over which such tribunals are given statutory jurisdiction. The jurisdiction of the minor courts is restricted as to the persons and cases triable by them, and as to the punishments which they may impose upon conviction.

When the cases referred to courts-martial for trial have been completed, or, in certain contingencies, at the discretion of the appointing power, they are dissolved by the authority that created them and simply cease to exist as military tribunals.

The General Court-martial.—This court has the most extensive jurisdiction, both in respect to persons and

cases, of any of the tribunals authorized by the articles of war. It may try any military offender, whatever his rank, for any act made an offense by military law. This court may be convened at any time by the president, or by the secretary of war acting in his behalf, by a general commanding a territorial division of an army in the field, or by a general or colonel commanding a separate territorial department. If the convening officer be the accuser or prosecutor, however, the court is convened by the president. In time of war two classes of persons are given authority to convene general courts-martial—commanders of divisions and commanders of separate brigades. This provision applies to the tactical organization of armies in the field, as distinguished from the geographical organization of military divisions and departments into which the territory of the United States and its insular possessions is habitually divided in time of peace.

Composition.—The statutes authorizing the several military tribunals known as courts-martial—contain the requirement that they shall be composed of *commissioned officers*—a term applied to persons in the military service, of and above the rank of additional second lieutenant, who have been appointed by the president, with the advice and consent of the senate, and whose appointments are evidenced by commissions under seal, signed by the president and countersigned by the secretary of war. The law requires that 'general courts-martial may consist of any number of officers, from five to thirteen inclusive; but they shall not consist of less than thirteen when that number can be convened without manifest injury to the service.' Such judicial powers, therefore, as are vested by statute in a general court-martial become operative and may be fully exercised by a properly constituted tribunal composed of at least five members. A less number is without power to enter upon the trial of a case, to proceed with a trial already begun, or to perform any act of a judicial nature. The number of officers who shall compose a particular court is determined, in conformity to the terms of the statute, by the proper convening authority, and his conclusion in that regard is final.

The Judge-Advocate.—All courts-martial having general, as distinguished from summary jurisdiction, are provided with officers, detailed for the purpose by the proper convening authority, whose duty it is to prosecute cases coming before them in the name of the United States. The appointment of these officers is vested by statute in certain convening officers, who, as a consequence of their power to appoint courts-martial, are authorized to appoint judge-advocates for the same. The office of judge-advocate is a temporary employment created by statute; the general duties of the office are defined in the Articles of War, which empower the judge-

advocate to prosecute in the name of the United States. Other statutes and regulations confer upon him the power to summon witnesses and in certain cases to compel their attendance by the issue of compulsory process. The law, regulations, and the custom of service thus vest in the judge-advocate the duty of preparing the case for trial and charge him with the responsibility of conducting the prosecution. In addition to his duty as prosecuting officer in behalf of the United States, the Articles of War provide that the judge-advocate 'shall so far consider himself counsel for the prisoner as to object to any leading question to any of the witnesses, and to any question to the prisoner the answer to which might tend to criminate himself.' The duty of the judge-advocate toward the accused should not be regarded as confined to the limited province of 'counsel for the prisoner' as the same is defined in the Articles of War. Where the accused is ignorant and inexperienced and without counsel —especially where he is an enlisted man—the judge-advocate should take care that he does not suffer upon the trial from any ignorance or misconception of his legal rights, and has full opportunity to interpose such plea and make such defense as may best bring out the facts, the merits, or the extenuating circumstances of his case.

Counsel.—An officer or soldier put upon trial before a court-martial is not entitled, as of right, to have counsel present with him to assist him in his defense, but the privilege is one which is almost invariably conceded if counsel be secured within a reasonable time; and where it is unreasonably refused, such refusal may constitute ground for the disapproval of the proceedings.

The Inferior Courts-martial.—The Regimental Court-martial.—The Articles of War provide that 'every officer commanding a regiment or corps shall be competent to appoint, for his own regiment or corps, courts-martial, consisting of three officers, to try offenses not capital.' In addition to the commanders of regiments, properly so-called, the chiefs of such of the staff corps as include enlisted men in their personnel may convene these courts at posts or places occupied by troops under their direct military control and command. The strictly criminal jurisdiction of this tribunal having been transferred to the summary court by a recent enactment of the congress, its functions are now largely restricted to cases which involve the redress of grievances alleged by enlisted men to have arisen in the administration of the commands to which they belong. It can now be lawfully convened for the trial of a soldier only in a case, properly referable to a summary court, in which the party defendant, being a non-commissioned officer, formally requests that the charges against him be passed upon by a regimental court-martial, or when such trial has been authorized by the officer competent to order the trial of the accused by a general court-martial.

The Garrison Court-martial.—While the garrison court-martial has the same jurisdiction in respect to offenses as the other inferior courts recognized by the Articles of War, its jurisdiction as to persons is considerably more extensive, and it may try enlisted men of any corps or arm of the service who are attached to, or form a part of, the command of the officer who has power to convene it. The regimental and garrison courts are each composed of three officers and, like the general court, are provided with judge-advocates. The procedure is the same as that of the general court, save that the testimony is not recorded.

The Summary Court.—This court is composed of a single officer and may be convened 'by the commanding officer of each garrison, fort or other place, regiment or corps, detached battalion, or company, or other detachment of the army.' The court may be appointed, however, and the officer who is to compose it may be designated by superior authority—that is, by the brigade, division, department, or post commander—when such a course is by him deemed either proper or desirable. The terms of the statute in respect to its constitution are thus seen to be extremely general and authorize the court to be convened by the commanding officer of a fort, camp, or other place, the garrison of which is composed of troops of the same or different corps; or by the commander of a regiment, battalion, separate company, or detachment in the field, without restriction as to its composition, for the trial of enlisted men charged with offenses falling within the jurisdiction of an inferior court in respect to the punishment which may be awarded upon conviction. When but one officer is present with a command the law requires that he shall constitute the court, and shall hear and finally determine such cases as are properly referable to it for trial.

As its name implies, the procedure of this court is summary in character. Cases are brought to trial within twenty-four hours after the arrest of the accused, or as soon thereafter as practicable, and the court sits at hours fixed by the post commander in appropriate orders or, in the absence of such orders, at the convenience of the court. The officer constituting the court is not sworn, but performs his duty under the sanction of his oath of office. The accused appears before the court and, as the right of challenge does not exist, is arraigned in the usual manner. The commanding officers who are authorized by law to approve the sentences of summary courts have power to remit or mitigate the same. When the commanding officer sits as a summary court, no formal approval of the sentence is required by law; but he should sign the sentence in such case in his official capacity as commanding officer, and date his signature.

Jurisdiction of Military Tribunals.—Courts-martial have power to try military persons only for military

offenses, save in time of war, when certain persons who accompany the armies in the field are similarly triable. The punishments which a general court-martial may impose include the capital penalty and are specified in the Articles of War; the power of the inferior courts to punish is restricted to three months' imprisonment, with or without forfeiture of pay, including reduction to the ranks in the case of a non-commissioned officer. The procedure of courts-martial is substantially the same as that of civil courts having criminal jursidiction. The accused may challenge any members for cause stated, but peremptory challenges are not allowed. The court and judge-advocate are sworn and testimony is received under the usual witnesses' oath. The allegations against the accused are embodied in 'charges and specifications' which correspond closely to the indictment and counts at criminal law; upon these the accused is arraigned and may plead to the jurisdiction, in bar of trial or in abatement of the action, and the court may decide any issues so arising; when these pleas have been exhausted, or if none of them be resorted to, a plea to the general issue is made, upon which the case goes to trial on its merits. The rules of evidence are those which regulate the admission of testimony in criminal cases in the courts of the United States. The judge-advocate prosecutes in behalf of the United States and, when the prosecution has rested, the witnesses for the defense are heard and the case is submitted on arguments in which the judge-advocate has the right to begin and close. The court is then closed for deliberation and a finding is reached, as to each separate charge and specification, by a majority vote. An appropriate sentence is then imposed, the majority rule prevailing, except in the case of a capital sentence, where a vote of two-thirds is necessary. The record is then forwarded to the officer who convened the court, whose province and duty it is to take action upon —approve or disapprove, etc.—the proceedings after the same are terminated and the record has been transmitted to him for such action. This officer is ordinarily the commander who has convened the court. In his absence, however, or where the command has been otherwise changed, his successor in command, or 'the officer commanding for the time being,' is invested with the same authority to pass upon the proceedings and order the execution of the sentence in a case of conviction.

In cases, however, of sentences of death or dismissal, imposed in time of peace, and of some death-sentences adjudged in time of war, together with all sentences 'respecting general officers,' while the convening officer (or his successor) is the *original* reviewing authority, with the same power to approve or disapprove as in other cases, yet, inasmuch as the law prescribes that the sentence shall not be executed without the confirmation of the president, the latter becomes in these cases the *final*

reviewing officer, and the sentence, having been approved by the officer who convened the court, the record is transmitted to him for his action. If, however, the proceedings or sentences are disapproved by the original reviewing officer, the record is not transmitted to the president, as there is nothing left in such case for the action of higher authority. Where a general court-martial is convened directly by the president as commander-in-chief, he is of course both the original and final reviewing authority. The authority of a military commander as reviewing officer is limited to taking action upon the proceedings and sentence by approving or disapproving the same, wholly or in part, and directing the execution of the sentence, and to the incidental function, of pardoning or mitigating the punishments which have been approved by him. Action not included within these powers he is not authorized to take. The power to remit or mitigate sentences awarded by military tribunals is conferred, in express terms by statute, which provides that 'every officer who is authorized to order a general court-martial shall have power to pardon or mitigate any punishment adjudged by it except the punishment of death or of dismissal of an officer. Every officer commanding a regiment or garrison in which a regimental garrison or summary court-martial may be held shall have power to pardon or mitigate any punishment which such court may adjudge.'

MILITARY OPERATIONS. See STRATEGY; TACTICS, MILITARY.

MILITARY ORDERS: religious associations which arose from a mixture of the religious enthusiasm and the chivalrous love of arms which almost equally characterized mediæval society. The origin of such associations may be traced to the necessities of the Christian residents of the Holy Land, in which the monks, whose first duty had been to serve the pilgrims in the hospital at Jerusalem, were compelled, for self-defense, to assume the character of soldiers as well as of monks (see ST. JOHN, KNIGHTS OF). The order of the Templars (q.v.) was of similar origin. Those of Alcantara and Calatrava in Spain had for immediate object the defense of their country against the Moors. These orders, as well as that of Avis in Portugal, instituted with a similar view, followed the Cistercian rule, and all three differed from the Templars and the Knights of St. John in being permitted by their institute to marry once. The same privilege was enjoyed in the Savoyard order of Knights of St. Maurice and the Flemish order of St. Hubert. On the contrary, the Teutonic Knights, who had their origin in the Crusades (see GRAND MASTER), were bound by an absolute vow of chastity. With the varying conditions of society, these religious associations have at various times been abolished or fallen into disuse; but most of them still subsist in the form of orders of knighthood; and in some

of them, attempts have recently been made to revive, with certain modifications, their original monastic character.

MILITARY SCHOOLS: institutions of instruction of various kinds, for persons connected with the army.—In the *British* army, they are divisible into several classes: 1. Those for the education of officers already in the service; of these, are the Staff College (q.v.), the School of Military Engineering, and Garrison Schools of Instruction. 2. Professional schools common to officers and men; for these, see ARTILLERY—*Schools:* MUSKETRY, SCHOOLS OF. 3. Schools for professional education of candidates for commissions; for these, see MILITARY ACADEMY, ROYAL; SANDHURST MILITARY COLLEGE. 4. Schools for men in the ranks and for their children; for these, see SCHOOLS, REGIMENTAL: for the instruction provided for their sons or orphans, see MILITARY ASYLUM, ROYAL.

In *France*, where a military commission is one of the best scholastic prizes looked forward to, no attempt is made to impart general education at the military seminaries; a boy is required to have a thorough general knowledge before he can be admitted to these institutions. Open to universal competition, and being the only channel—or nearly so—to the best employment under the state, the great military schools, by the high standard required for them, give great impetus to general education; and the Lycées, or public schools, adapt their course of instruction to the anticipated competition. In the army two-thirds of the line commissions (after a service of two years in the ranks, or after one year's service, and passing the final examination at the Infantry School at St. Maixent), and one-third of those for the scientific corps, are given to non-commissioned officers, but few of these rise beyond the rank of captain; the remaining commissions in the line and scientific corps, and all appointments to the staff, are given by competition, after a careful course of professional education. The candidates in open competition (in civil subjects only) are placed according to merit either in the Infantry School of St. Cyr, or the celebrated Polytechnique; at both colleges they have the right, if they need it, to partial or entire state support. From the School of St. Cyr, the more promising pupils pass to the Staff School, and thence, after a thorough course, to the Etat Majeur of the army; the remaining students pass as subalterns into the line. The pupils of the Polytechnique, which is entered after the age of 17 years, have annually about 160 valuable prizes open to them. The first 30 to 40 candidates usually select civil employment under the state, such as the 'Ponts et Chaussées;' those next in merit choose the artillery and engineers, and pass through a technical course at the School of Application. The remaining students either fail to qualify, and leave the school, or have to content themselves with commissions in the line, subordinate situations in

the government, civil or colonial service, or they retire into civil life altogether. In actual service, there are schools for the men, who are taught also trades and singing. The standard of education among French is far higher than among English soldiers, as the conscription draws the men from all classes of society.

In *Germany*, the system of military education differs from that of France in that competition is sparingly resorted to; and the object is to give a good general and professional education to all the officers, rather than a specially excellent training to a selected few. Aspirants for commissions must enter in the ranks as gentleman-volunteers (*avantageurs*), and within six months pass a good examination in general and liberal knowledge (about equivalent to that passed in England for entrance into Sandhurst); if, however, the candidate has been educated in a cadet-house—semi-military schools for youths—and has passed properly out of it, he joins the army in a rank equivalent to midshipman in the navy (*porte-epée fähnrich*). After some further service, the aspirant goes for nine months to one of three 'Division Schools,' where he completes his professional education. If he pass the standard here required, he is eligible for the next vacancy, but cannot be commissioned, unless the officers of the corps are willing to accept him as a comrade. The Artillery and Engineer schools do for those services what the Division Schools do for the line. The culmination of German military education is the Staff School, open to competition for all the officers of the army, and presenting the highest prizes in the profession. In all the schools, the candidates study at the expense of the state, or receive great auxiliary grants.

In *Austria*, the preliminary step to a commission is obtaining the rank of a cadet, either from a Cadet School (which boys have to enter at an early age), or by passing the same examination as cadets from these schools have to pass. If recommended, they become officers after a year's service and showing a proper knowledge of their work. Cadets from the schools have the advantage of being commissioned at once if qualified. The young officer's chance of entering the Staff School—and therefore the staff—depends on his place at the final examination at a line or scientific corps academy. There are schools for training for non-commissioned officers and for officers; and senior departments for imparting more extended instruction to both classes. Candidates for appointment as non-commissioned officers pass by competition through the lower houses, where they remain till 11 years old; the upper houses, which detain them till 15; and the school companies, whence, after actual apprenticeship to service, a few pupils pass to the academies for aspirants for commissions, and the others are drafted into the service as non-commissioned officers.

In *Italy*, the system nearly approaches that of France.

The educational status of the Italian officers is considered high.

For governmental military education in the United States, see UNITED STATES MILITARY ACADEMY.

MILITARY SECRETARY: officer on the personal staff of generals in high command. His duties are to conduct the correspondence of his chief, and to transact a great amount of confidential business, which would quite unduly occupy the time of the general himself.

MILITARY TRAIN: formerly a highly important corps of the British army, having the function of transporting the provisions, ammunition, and all other material, together with the wounded in time of battle. It was formed after the Crimean war, on the dissolution of the Land-Transport Corps, and comprised six battalions, in all 1,840 officers and men, and 996 horses, with proportionate wagons and ambulances. It constituted only the nucleus of a transport service for a large army. It was disbanded 1870, as being too military in its formation; and its functions are now performed by the transport staff of the commissariat department, assisted in time of war by a regimental transport train.

MILITELLO, *mē-lē-tĕl'lō:* city of Sicily, province of Catania, 21 m. s.w. of the town of Catania; on a mountain, in a somewhat unhealthful situation. In its vicinity are important salt lagoons. Pop. 10,000.

MILI'TIA: term which has now acquired the meaning of the domestic force for the defense of a nation, as distinguished from the regular army, which can be employed at home or abroad in either aggressive or defensive operations. Every nation has a reserve, under its law military, upon which its defense would fall, on the serious discomfiture of the regular army, or of a portion of it; but the system differs in each country.

In Great Britain, the militia is a constitutional force raised under sanction of parliament, in which the people —in theory, at least—wage their own bodies for the defense of their own soil, and in which they depute the sole leadership and command to the sovereign and the crown nominees. Organized by counties and cities, it is essentially a local force; but the right of granting commissions, formerly held by the lords-lieutenants, was transferred to the crown by the act of 1871. Under the Anglo-Saxons, all men were required to bear arms, as a sort of body-rent for the land that they held; but no special organization being adopted, efficiency was rarely attained in the use of arms. This the nation found, to its cost, when the Danes overran it during Alfred's reign. That great king, to prevent a similar occurrence, established the militia or *fyrd,* making land the basis of numbers, but the family system the basis of discipline: so many families were a tithing, ten tithings a hundred, and hundreds were united into county powers, each under its

heretoch, dux, or duke. Each section of the community had not only to furnish its quota in time of war, but also to provide arms, keep them in repair, and undergo so many days' training every year. This arrangement subsisted in more or less vigor until the Conquest; then the feudal troops at first rendered the militia unnecessary; but it never wholly ceased to exist. When the crown began to contend with the Norman barons, it naturally found its most powerful instrument in reviving the Saxon militia; and the English yeomanry became thenceforth the fear of England's enemies, and a guarantee for the gradual enfranchisement of the people. Henry II. established 'an assize of arms,' at which every holder of land was bound to produce one or more men fully equipped, and capable of fighting in the national defense. This annual assembly of the fyrd or militia is recorded after the Conquest first in 1181. Further alterations to suit advances in the art of war took place 1558. In 1604, James I. abolished the fyrd, and substituted 'Trained (commonly called Train) Bands,' to the number of 160,000 men—a force partaking of the nature of militia and volunteers, but deficient in discipline and drill. During the civil war of Charles I., the train bands or militia mostly sided readily with the parliament. Up to this time, the command had never by any law been definitely assigned to the crown or to any other authority. After the Restoration, the loyal parliament of Charles II. immediately reorganized the militia—essentially on its present footing—and declared as law that 'the sole supreme government, command, and disposition of the militia is, and by the laws of England ever was, the undoubted right of his majesty and his royal predecessors.' As, however, the crown from this time began to depend for its support upon a mercenary army, the militia was neglected until 1757, when a large portion of the regular army being absent in the Seven Years' war, it was carefully organized for defense of the kingdom. Several militia acts have been subsequently passed. In 1871, the control of the militia was transferred from the lords-lieutenants to the war office. Various laws on army organization, completed 1876, had for a prominent aim the consolidation of the national defenses by bringing the army, militia, and other military forces into closer connection. The United Kingdom is now divided into military districts, with infantry regimental districts (besides cavalry and artillery territorial divisions). The members of the militia volunteer into the reserve, and may thence, in time of emergency, be directly drafted into the regular army.

In practice, the quota of men for each district is raised by voluntary recruitment; but should volunteering fail, a levy by ballot, for which the legal power always exists, would be made on all the inhabitants of the locality between the ages of 18 and 35. Many classes

are exempt from the ballot—e.g., peers, soldiers, volunteers, yeomanry, resident members of universities, clergymen, parish schoolmasters, articled clerks, apprentices, seafaring men, crown employés, free watermen of the Thames; in England, any poor man with more than one child born in wedlock; in Scotland, any man with more than two lawful children, and not possessed of property to the value of £50; in Ireland, any poor man not worth £10, or who does not pay £5 per annum for rent, and has more than three lawful children under the age of 14. The militia battalions are bound, when called by the crown, to assemble annually for any period not exceeding 28 days for training purposes; and the government can embody the whole, or part of the force, at any national crisis. In 1815, the militia had been embodied for nearly 20 years, and the regiments were again embodied almost without exception during the Russian war of 1854-56, and to a considerable extent at the time of the Indian mutiny, 1857-59. The militia now number about 97,000 men. They may not be sent out of the kingdom, except they volunteer, and then only by special permission of parliament. As a defensive or garrison force, setting free the regular army for aggressive operations, the militia is a most valuable institution; and in times of war it has ever been found an admirable training-school whence soldiers volunteer into the permanent forces. Its efficiency has been vastly increased during the last 25 years. When out for training, or embodied for permanent duty, the militia officers and men receive the same pay as regular troops of corresponding arms of the service, and are under the army discipline act, except that no punishment can extend to life or limb. The officers rank with, but junior to, their brethren of the regular army, and are always subject to military law.

American Militia.—The peculiar life of the colonies in America rendered it necessary that the colonists should keep themselves armed and experienced in the use of weapons of defense. Inheriting the institutions of the mother country, the existence of a militia was an assumed matter in their organization. The adoption of the constitution of the United States in 1789 was the subject of innumerable debates and political views and prophecies, and the proceedings of the constitutional conventions concerning the adoption of the clauses relating to the militia are most interesting as a matter of political history; space, however, will not permit an account of them. Singularly enough, South Carolina and Virginia were on the side of giving the government greater power, while Massachusetts and Connecticut were opposed to curtailing the state control.

The majority tried in many instances to yield the very minimum to the general government of the powers deemed essential to that government. But the conviction was general that the militia must be trained with uni-

formity, and be so organized as to become a defense to the nation, and that the only authority to provide therefor was the general government. Hamilton in the *Federalist* fully defended the constitutional plan. Patrick Henry in Virginia was convinced that ruin would follow the adoption of the law. So much concern was felt regarding the militia that among the ten amendments which were promptly made, and declared to be in force 1791, Dec. 15, was that (No. 2) providing 'a well regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.' The state constitutions and the state laws have from time to time, and invariably, dealt with the militia of the respective states, and are held by the courts to be controlling, so far as not inconsistent with the federal laws, but they have not been uniform as to service, duty or organization. They have generally provided for organizing those who wished to volunteer, and the respective governors of states are commanders-in-chief of their militia. It has been demonstrated by time that congress by the act of 1792 made an ineffective law, by prescribing uniform duties for the entire male population composing the militia, and though thereafter for over one hundred years the law was retained with slight amendment upon the statute book, it was not enforced and was the subject of repeated efforts at modification. The presidents of the United States, notably Washington, Jefferson, Madison, Adams, Jackson and Van Buren, in their messages to congress, urged further legislation to create an efficient militia. Elaborate reports were made from committees in congress, but nothing was accomplished except that in 1808 an annual appropriation of $200,000 was begun, which was increased in 1887 to $400,000, and in 1900 to $1,000,000. Between 1819 and 1825 various bills and propositions were advanced for a classification of the militia, so that only a small part of it should have duty to perform in time of peace, then a board was convened by the secretary of war which made a report that was transmitted to congress, recommending the instruction of officers in camps of instruction ten days each year. Jackson urged encouraging volunteer organizations. The secretary of war of President Van Buren's cabinet, in 1840, proposed that 100,000 men apportioned to the states be maintained by draft or otherwise, to serve four years, one-fourth to go out each year, and to form the reserve, continuing as such four years more; the president to order the active portion on duty 30 days each year, and defray all charges for pay, subsistence, etc. It is said that no subject, except finance, was more discussed, prior to the civil war, than the militia. The debates in congress are full of it, reports and bills are numerous, both from the war office and the committees of the senate and house, but, as stated, they were unacceptable, until after the war with Spain. The language of

the constitution, 'reserving to the states respectively the appointment of the officers, and the authority of training the militia according to the discipline prescribed by congress,' has always been an insurmountable obstacle to federal control of the militia in time of peace. As indicated, the army and congress long endeavored to secure the adoption of a plan to limit the militia to a practicable number, and the volunteer militia, or that proportion which the states have organized into companies or regiments, has, for many years, been regarded as a practicable number, as indeed it will always be, if motives of patriotism and eagerness to acquire military knowledge can be made the incentives to volunteer, and it be understood by the people that the government wishes to maintain the force to embody such ideals only.

Military Law of 1903.—In 1903, the United States congress adopted a new militia law, by which the militia was defined to be practically all able-bodied males between 18 and 45 years, divided into two classes, namely (*a*) 'the Organized Militia,' being such forces as may be created, under state laws, regardless of the name they bear, and (*b*) the remainder of the militia. A period of five years is given to all the states to adopt laws making the organization, drill and discipline of their organized militia the same as that of the regular army, and the participation of the states in an annual appropriation of $1,000,000 is made dependent on such state action, and the creation of forces accordingly; the limit in number of troops is apparently that of the law as it stood theretofore, to wit, 100 men for each congressional representative; meanwhile those states which have been entitled to participate in the annual fund continue to do so, and at once their forces became a part of the 'Organized Militia.' Authority is given to the president to call forth such number of the militia, 'organized' or 'reserve,' as he may deem necessary, in case of invasion, danger of invasion, rebellion, or inability to execute the laws of the Union, and any officer or enlisted man who shall neglect to present himself to a mustering officer to be mustered into the service of the United States, if found fit, shall be subject to trial by court-martial. No provision is made for such other portion of the militia who may be called forth. The time of such service shall not exceed nine months. The states are required to have each an adjutant general, whose duties the state laws define, except as to reports to the secretary of war; these the latter may prescribe. Provision is made for supplying the states on requisition with arms, belts, equipment, ammunition, etc., the same to remain the property of the United States government. The secretary of war is required to cause annual inspections to be made, and such states as have the requisite organized militia may obtain so much of their allotment from the annual appropriation as shall be necessary to transport, pay and

subsist such portion of their forces as shall engage in field or camp service. The secretary of war may also provide for the participation of any part of the organized militia of any state in any camp or field maneuvers of the regular forces at or near military posts or defenses of the United States. These charges are from the appropriation for the army. The militia appropriation is also available for stores, supplies, or publications; and states may also buy such property at army listed prices. The annual duty required is prescribed, and regular officers may be detailed to states for duty with the organized militia. Ammunition for firing and target practice may be supplied at regular military posts, and officers of the militia may be allowed to attend at military schools or colleges of the United States, and be examined to be certified for fitness to be commissioned. The application of the law will test the wish of the people to put a particular part or all of the militia under the control of national authority. The questions involved are national control of the militia in time of peace, national participation in the control of the militia, national control of all or part of the militia through the officers of the regular army, or national control through some other agency, wholly or in part under direction of the officers of the regular army.

National or State Guard.—For one hundred years the militia has been called the state force, being in time of peace under the state, as in England it was under the county; the new law while recognizing the states' control seeks to secure uniformity and perfection through active national participation in control, and by the contribution of money and property, and is reported by the war department to be in process of successful solution. The term 'National Guard' has been adopted by some states to designate its organized or volunteer militia. This appellation was adopted by one of the most famous militia organizations of the world, the 7th Regiment of New York, at the time Lafayette visited America in 1824, and in his honor, after the 'Garde Nationale.' The state of New York appropriated the term in 1862 to describe the organized militia, and other states have followed; but if the organized militia can be made and kept a volunteer body, founded on patriotic service, the term that Massachusetts has used, 'Volunteer militia,' is more correct. The organized militia of the states bear names as follows: Florida, 'State Troops'; Kentucky, 'State Guard'; Louisiana, 'State National Guard'; Delaware, 'Organized Militia'; Virginia, 'Volunteers'; Massachusetts, 'Volunteer Militia.' The remaining states use the term 'National Guard.' A table compiled in 1907 showed the state militia to comprise 1,129 generals and officers of their staffs, 4,710 cavalry, 7,148 artillery, 92,226 infantry, making a total of 105,213. The total number liable to military service is estimated at 13,800,000 men.

The naval militia of the states aggregated in 1907, 504 officers and 5,225 men. Heretofore militia of the United States meant militia called into the service of the United States. The volunteer militia of many of the states, notably New York, contain some military organizations so excellent in drill, discipline, rifle shooting and general military proficiency as to be easily comparable with corresponding bodies in the regular service. This is attained by the work of men who are fond of military labors, and who have patriotic pride in performing them, and by those who know how to utilize such elements in the community. As the officers and men maintain themselves, and oftentimes those dependent upon them, and have civic and social ambitions, as well as those of a military character, it is necessary to be judicious in selecting and managing volunteers, in order to inculcate military knowledge and maintain zeal for public service. It will thus be seen that the subject of the militia is a political, economic and patriotic question of statecraft. The military sciences and their representatives enter because the question relates to the embodiment of national force, but they enter only for the perfection of a result and not for its creation. The chief executive of a nation is its chief commander, but the military power is subordinate to the civil power, except when the military power must be exercised. Asserting that this should be always kept in mind, Hallam says: 'Nothing would more break down this notion of the law's supremacy than the perpetual interference of those who are really governed by another law; for the doctrine of some judges that the soldier, being still a citizen, acts only in preservation of the public peace as another is bound to, must be felt as a sophism even by those who cannot find an answer to it.'

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MILK, n. *milk* [see MILCH]: white fluid drawn from

the breast of mammiferous females for the nourishment of their young; white fluid yielded by the cow; the white juice of plants: V. to draw or press out the milk of; to draw from the udder of a cow; to add milk to. MILK'ING, imp. MILKED, pp. *mĭlkt*. MILK'ER, n. *-ĕr*, one who milks. MILKY, a. *mĭlk'ĭ*, yielding milk; full of milk; juicy; whitish, as milky fluid; gentle. MILKILY, ad. *mĭlk'ĭ-lĭ*. MILK'INESS, n. *-nĕs*, qualities like those of milk. MILK'MAID, a woman that milks cows, or is employed in the dairy. MILK-QUARTZ, a compact, vitreous variety of quartz, occurring in veins of the older rocks, of a milk-white color and somewhat greasy lustre. MILK-SNAKE, or CHICKEN-SNAKE (*Ophibolus eximius*), harmless snake, usually small, though sometimes 5 ft. in length; occasionally found in stables, dairies, and houses. It feeds on mice, toads, insects, and little birds. It is of milk-white color above, sometimes tinged with red and with dusky spots, and of silvery or yellowish white below. MILK'SOP, a piece of bread dipped in milk; a soft, effeminate man. MILK'-TEETH, the first or deciduous teeth. MILK'-TREE, a tree yielding a milky juice fit for food; the Cow Tree (q.v.): the juice of the *Tab'ernæmon'tănă utĭlĭs*, ord. *Apocynăcĕæ*. MILK-VETCH (see ASTRAGALUS). MILK-WEED (see ASCLEPIADACEÆ; ASCLEPIAS). MILK'-WHITE, white as milk. MILK-WORT, small wild plant with blue, pink, or white flowers; the *Polyg'ăla vulgāris*, ord. *Polygalăcĕæ* (see POLYGALA). MILKY WAY, the broad white zone or belt seen in the heavens, slightly luminous, ascertained to be formed of innumerable stars; the galaxy (see GALAXY). SUGAR OF MILK. See SUGAR (*Milk Sugar*). MILK OF LIME, slaked lime in water—having a milky appearance.

MILK: opaque white fluid secreted by the mammary glands of females of the class *Mammalia*, after they have brought forth their young, and during the period in which their offspring are too immature to subsist on solid food. It is devoid of odor, except for a short time after its extraction; is of slightly sweet taste, usually of a slightly alkaline reaction (except in the *Carnivora*, in which it is acid); and its average specific gravity (in the case of human milk) is 1032.

When milk has been allowed to stand for some time, a thick, fatty, yellowish-white stratum (the cream) forms upon its surface. When this is removed, the fluid below (popularly known as 'skim-milk') is found to be of greater specific gravity, and of a more bluish-white tint. Milk does not coagulate on boiling, but a membrane or film of coagulated caseine, containing fat corpuscles, forms upon its surface. If milk be allowed to stand for some days exposed to air at the ordinary temperature, it gradually exhibits an increasing acid reaction, from the formation of lactic acid from the milk-sugar; while the caseine, becoming coagulated by the action of the lactic acid, is separated in the form of 'curds,' and

the fluid gradually assumes the form of a thickish pulp. The ordinary means of obtaining the caseine (which exists in solution in the milk) in the form of curds is by the addition of a piece of rennet (the dried stomach of the calf), which acts as powerfully as any acid. The curds thus separated form the basis of cheese, while the fluid portion left after their removal is known as the 'whey.'

The following table, based on the researches of Vernois and Becquerel, represents the density and composition of 1,000 parts of milk in various animals:

	Density.	Water.	Solid Constituents.	Caseine and Extractive Matters.	Sugar.	Fat (Butter).	Salts.
Woman	1032.67	889.08	110.92	39.24	43.64	26.66	1.38
Cow	1033.38	864.06	135.94	55.19	38.03	36.12	6.64
Mare	1033.74	904.30	95.70	32.35	32.76	24.36	5.23
Ass	1034.57	890.12	109.88	35.65	50.46	18.53	5.24
Goat	1033.53	844.90	155.10	35.14	36.91	56.87	6.18
Ewe	1040.98	832.32	167.68	60.78	39.43	51.31	7 16
Bitch	1041.62	772.08	227.92	116.88	15.29	87.95	7.80

The actual caseine, which in the preceding analyses is associated with the undefined group of substances termed *extractive matters*, ranges from 27 to 35 in 1,000 parts of healthy human milk, while in the colostrum (the milk secreted immediately after parturition) it amounts to 40; in the milk of the cow it is somewhat higher; while in that of the bitch, and probably all carnivorous animals, it is more than trebled. It is found in the case of women that the quantity of the caseine increases with the free use of animal food, and diminishes on vegetable diet.

When examined under the microscope, the milk appears as a clear fluid, containing fat globules (the milk globules, as they are usually called) in suspension. They commonly vary from 0.0012 to 0.0018 of a line in diameter. They are each invested with a delicate coat of caseine, which prevents their running together. By *churning*, the surrounding envelopes become ruptured, and the contents are made to unite, forming *butter*. In addition to milk globules, colostrum globules (see COLOSTRUM), which are irregular conglomerations of very small fat globules, occur in the milk for the first three or four days after delivery of the offspring.

The fatty matters range from 25 to 43 in 1,000 parts of women's milk, while in cows' milk they average, according to Lehmann, 45; and in bitches' milk rise to 110. These fatty matters, which collectively form butter, consist of an admixture of 68 per cent. of margarine, 30 per cent. of oleine, and 2 per cent. of an admixture of fats, which, on saponification, yield butyric, caproic,

capryllic, and capric acids. The milk which is last yielded is much richer in fat than that first drawn.

The sugar (for whose properties, see SUGAR [*Milk Sugar*]), varies in human milk from 32 to 62 in 1,000 parts, and in cows' milk from 34 to 43. The milk of bitches, when fed on a purely animal diet, often contains no traces of sugar; but if they are fed on vegetable or mixed food, considerable sugar is found. The salts in women's milk range from 0.6 to 2.5 in 1,000 parts, and in cows' milk from 3.5 to 8.5. That a peculiar selective power is exerted by the mammary gland, is shown by the following table, which shows the comparative analyses of the ashes of cows' milk and of cows' blood, each reckoned for 100 parts:

	Ash of Milk.	Ash of Blood.
Chloride of potassium	14.18	none
Chloride of sodium	4.74	38.82
Potash	23.46	11.44
Soda	6.96	29.09
Phosphoric acid	28.40	7.74
Lime	17.34	1.90
Magnesia	2.20	0.75

Human milk is liable to tolerably regular changes at different periods of lactation—e.g., the sugar is deficient during the first month, and is in excess from the eighth to the tenth month; the caseine is in excess during the first two months, and is most deficient between the tenth and eleventh months; the butter is considerably in excess during the first month, and slightly so for the next two months; while the salts are most abundant during the first month, but present no regular law of decrease. Hence, it will readily be seen that, in the selection of a wet-nurse, one of the leading requirements should be, that her milk should be of the same age as that of the mother's. Various medicines—e.g., iodide of potassium, iodide of mercury, and quinine, have been detected in the milk, after being taken by the mother; and many cases are on record in which strong mental impressions, as fear or anger, acting on the mother, have so far poisoned the milk as to cause immediate convulsions in the infant.

The daily quantity of milk is dependent on various conditions, such as bodily constitution, food, etc. Lampérierre determined the quantity of milk secreted in definite times by a large number of women, and found as a mean for each breast between 50 and 60 c.c (the cubic centimetre being about 15 drops) in the course of two hours, assuming that the secretion continues at uniform rate.

In those cases in which a wet-nurse cannot be obtained, it is expedient to modify cow's milk, so as to make it resemble that of women. The main differences are that the former contains more caseine and less sugar and water than the latter.

The milk of cows is extensively used as an article of

diet both for healthy persons and for invalids, and it enters largely into all hospital, prison, and work-house dietaries. In patients with a tendency to consumption, or in whom that disease has already manifested itself in its early form, cream is often of great service, especially when the stomach cannot bear cod-liver oil.

For the adulterations to which milk is often subjected, see FOOD: for the instruments used for testing the purity of this fluid, see GALACTOMETER, under GALACTIC. Water is by far the commonest adulteration, and if it has been added in large quantity, the fraud may be detected by evaporating a small weighed quantity of the milk (say one ounce) to dryness, and ascertaining whether the due proportion of solid constituents is left.

Various methods have been proposed for the preservation of milk for sea-voyages, etc.: the preparations are named desiccated milk, solidified milk, essence of milk, etc. The best process is that which does not prepare from the milk extracts which are not milk, but that which, by condensing, preserves the milk itself. Gail Borden, of White Plains, N. Y., devised the process of condensation in vacuum pans, in one of which, with boilers of adequate power, 2,000 qts. per hour can be condensed—the water being thus removed: a little sugar is added, and the product, hermetically sealed, may be kept for an indefinite time. Borden's 'plain condensed milk' has no sugar, and may be kept a few days without hermetical sealing. Condensed milk is now largely used.

Owing to its peculiar composition milk is an excellent culture fluid, i.e., one in which bacteria readily proliferate, and consequently, unless it is very clean and kept at a low temperature, its use as food, especially for infants and young children, is liable to cause sickness. Epidemics of disease—typhoid fever, scarlatina, diphtheria, and infantile diarrhea—are often caused by contaminated milk, and it has been shown that tuberculosis, especially in children, may be caused by the milk from tuberculous cows. The contamination of milk with disease germs may occur in a multitude of ways—during milking, from dirt on the udder of the cow, on the hands of the milker, or in the pail into which the milk is received; during transportation, from insufficiently washed cans or by mixture at the central station or creamery with other unclean milk; in the shop, from careless handling, from unwashed dippers, or from a dirty pitcher or other receptacle in which it is carried home; and in the house from careless handling, from exposure, and from feeding in unwashed nursing bottles, especially those fitted with a rubber tube which can never be properly cleansed. At every stage, from the cow to the consumer, it is liable to contamination from exposure to the air, and unless it is kept at a low temperature (below 50° Fahrenheit) the bacteria so admitted rapidly increase in numbers. The greatest care

is necessary to prevent this contamination. The dairy and everything appertaining to it—the barns, the pails, the cows, and the milkers—should be kept scrupulously clean, and the cows should be readily examined at stated intervals by competent veterinarians. Any animal that is found to be tuberculous should be at once isolated and its milk should under no circumstances be used. The best means of preserving milk pure is to cool it at once and then place it in sealed bottles to be opened only by the consumer. This is, however, an expensive process, and the cost to the consumer is so great as to put it beyond the reach of the poor. The danger of contamination of the ordinary milk supply is so great, even with the best of care, that the only safety lies in its sterilization or pasteurization. Both these processes are effected by heat. Sterilization consists in boiling the milk for 10 minutes, which destroys most of the bacteria, though not always their spores. Boiling, however, alters the taste of milk and also changes its constitution, rendering it less fit for food, especially in the case of infants and young children. It is claimed, indeed, that rickets and other diseases may be caused by feeding children on boiled milk. The second process, that of pasteurization, is therefore preferable. This consists in exposing the milk to a temperature of 150° Fahrenheit for 30 minutes, and then cooling immediately to a temperature of 50° and maintaining it at this temperature until it is consumed. By this process most of the bacteria are destroyed, and the spores, which are nor pasteurization will make a really dirty milk clean temperature. Pasteurization does not change the taste of milk nor does it materially alter its constitution so as to affect its nutritive qualities. Neither sterilization nor pasteurization will make a really dirty milk clean nor render it fit for consumption; it merely destroys the existing bacteria and prevents their further growth, but it does not destroy the poisons (toxins) which the bacteria have already elaborated prior to sterilization, nor the material filth—cow dung, dust, hair, etc.—which may have found their way into the fluid at the time of milking or subsequently. Absolute cleanliness at the dairy and during transportation is therefore essential, and no carelessness in this respect should be tolerated whether the milk is subsequently to be sterilized or pasteurized or not. With a little care and experience pasteurization may be done in the home as well, and more cheaply, as in large establishments. The addition to milk of chemical preservatives—boric acid, salicylic acid, formalin, etc.—is injurious and is forbidden by law in most states, and should be in all.

MILK-FEVER: fever which accompanies or precedes the flow of milk. In the lower animals it comes on within a few days after parturition. One variety, common to most animals, consists in inflammation of the

membranes of the womb and bowels, and is produced by exposure to cold, overdriving, or injury during labor; it is treated best with oil and laudanum, tincture of aconite, and hot fomentations to the belly. The other variety (called also 'milk-sickness' and 'trembles'), almost peculiar to the cow, attacks animals in high condition, that are good milkers, and have already borne several calves; it consists in congestion and inflammation of the brain and large nervous centres, and impairs all the vital functions, leading to dullness, loss of sensation and motion, and stupor. Later trembling appears, the animal is obstinately constipated, and extreme thirst is apparent. Blood must be drawn early, while the cow is still standing and sensible. Later, blood-letting only hastens death. A large dose of physic, such as a pound each of salts and treacle, a drachm of calomel, an ounce of gamboge, and two ounces of ginger, should at once be given, solid food withheld, clysters of soap, salt, and water thrown up every hour, cloths wrung out of boiling water applied along the spine, the teats drawn several times daily, and the animal frequently turned. Although treatment is uncertain, prevention is easily insured by milking the cow regularly for 10 days before calving, feeding sparingly on laxative unstimulating food, giving several doses of physic before, and one immediately after, calving; and when the animal is in very high condition, and prone to milk-fever, bleeding her a day or two before calving. Early medical writers described a similar affection in man, supposed to be caused by drinking the milk of diseased cows. It was probably some other disease, possibly typhoid fever.

In women, there is a tendency to this fever, but the development is usually very slight, in some cases scarcely noticeable. Its time for appearance is about the third day after parturition, and robust or plethoric women are most affected by it. It usually passes away of itself without special treatment.

MILK-SICKNESS. See MILK-FEVER.

MILL, n. *mĭl* [AS. *mylen;* W. *melin;* Dut. *molen;* Ger. *mühle;* Gr. *mulē;* L. *mola,* a millstone or mill: L. *molĕrĕ;* Ger. *mahlen;* Goth. *malan;* W. *malu,* to grind]: a machine in which corn and other substances are ground into meal and flour; a machine for spinning, weaving, sawing, or for performing other operations; the building in which such operations are carried on: V. to grind; to press or stamp, as the edges of coins; to full, as cloth; to cause to froth, as to mill chocolate. MILL'ING, imp.: N. the act or employment of grinding; the act of being operated on by machinery; the act of making indented or rough edges on coins; the rough edges thus made. MILLED, pp. *mĭld:* ADJ. passed through a mill; operated on by machinery; having the edge indented or slightly toothed, as coins. MILLER, n. *mĭl'ĕr,* one who keeps or attends a corn-mill; a certain winged insect. MILL'-

BOARD, a stout pasteboard made in a mill in the same way as ordinary paper. MILL'-DAM, the barrier of stone and wood placed in the bed of a stream to retain the water and raise its level for the purpose of turning a mill-wheel. MILL'-POND, a reservoir of water to turn a mill. MILL'-RACE, the stream that drives a mill. MILL'-STONE, one of the grinding-stones of a mill (see BUHR-STONE). MILLSTONE-GRIT, a hard gritty variety of Carboniferous sandstone, species of conglomerate extensively used in England for millstones; a division of the Carboniferous system, between the Carboniferous limestone and the Coal-measures. In the Appalachian range in Penn. it is more than 1,200 ft. thick, a coarse siliceous conglomerate; in Va. it is chiefly sandstone, about 1,000 ft. thick; in Ala. it is quartzose, and used for grindstones. MILL'-WRIGHT, one who constructs and repairs mills. MILLED LEAD, *mĭld lĕd*, lead rolled out into sheets by machinery. TO SEE INTO OR THROUGH A MILLSTONE, to be acute; to be sharp-sighted mentally.

MILL, v. *mĭl* [see MILL 1]: in *slang*, to beat severely with the fists; to bruise by boxing with the clenched hands: N. a prize-fight. MILL'ING, imp. MILLED, pp. *mĭld*, well pounded or thrashed with the fists.

MILL, n. *mĭl* [L. *millĕ*, a thousand]: in the *United States*, an imaginary money of account, the tenth of a cent, or the thousandth of a dollar.

MILL, in Law: a property carrying certain riparian rights. The owner of a mill situated on the bank of a stream is entitled to the use of the stream undiminished in volume; and if other riparian owners above interfere with the stream by diminishing its volume, thereby causing injury to the mill, the mill-owner has a right of action against them.

MILL, GRIST: machinery for grinding; also manufactory containing such machinery, for reducing grain to meal or flour.

From time immemorial, grain has been ground by a pair of stones. The earliest and rudest hand-mills were, no doubt, somewhat like that shown in fig. 1, a representation of one sent to England by Dr. Livingstone, the African traveller, from the banks of the Shiré, in s. Africa.

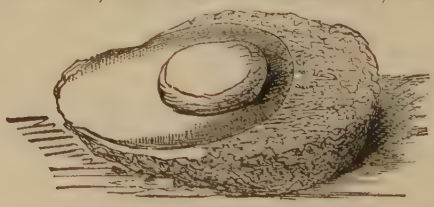


Fig. 1.—African Hand-mill.

He describes it as 'a mill such as Sarah used, when told by her lord to do the thing handsomely and in a hurry

for the strangers—i.e., a big stone worn hollow by the operations of grinding. The upper stone is grasped by both hands, and the weight of the body brought down on it as it is shoved to the lower part. . . . The meal is made very fine.' The next step in advance of this was the quern or hand-mill, still in use in the Shetland Isles, the Faröes, and other places. The old quern scarcely differs from a pair of modern millstones, except in the stones being small enough to allow of the upper one being turned by the hand, instead of by wind, water, or steam-power.

The millstones now almost universally used for grinding corn or grain are made from buhrstone, a form of silica like flint in hardness, but not so brittle. This rock is found in abundance only in the mineral basin of Paris and some adjoining districts, and belongs to the Tertiary formation. It is of cellular texture, and is frequently full of silicified shells and other fossils. Millstones are usually four to six ft. in diameter, and are each made up of a number of pieces strongly cemented and bound together with iron hoops. One six ft. in diameter, of fine quality, will cost about $250. The grinding surface of each stone is furrowed or grooved in the manner shown in fig. 2, the grooves being cut perpendicularly on the one side, and with a slope on the other.

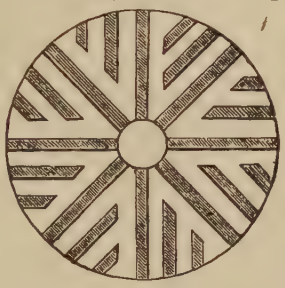


Fig. 2.—Millstone, showing Grinding Surface.

A pair of stones are used together, and both being furrowed exactly alike, the sharp edges of the grooves on the one come against those on the other, and so cut the grain to pieces.

Fig. 3 shows a section of a flour-mill reduced to its simplest elements. The millstones are at *a*, the lower of which is firmly fixed, it being a matter of importance to have this done securely; and the upper is made to revolve, on a shaft which passes up through the lower one, at a speed of one hundred revolutions per minute, more or less. Motion is communicated by the spur-wheel *b*, driven by a water-wheel or other power. The grain, previously cleaned, is supplied to the millstones by means of the hopper *c*, connected with which there is a valve, *d*, for regulating the supply. Passing through a hole in the centre of the upper millstone, it comes in be-

tween the two, where it is ground, and thrown out on all sides by means of the centrifugal force. The millstones are, of course, inclosed, and the flour passes down through the spout *e*, to the worm at *f*, which, while it cools the ground grain, carries it along to elevators *g*. These raise it up to the floor, on which the silk dressing-machine, *h*, is placed. This is a cylinder, which was formerly made of wire-cloth of various degrees of fineness, and consequently separated the flour into different qualities—the finest passing through the first portion, the second passing through the next, and so on; but no

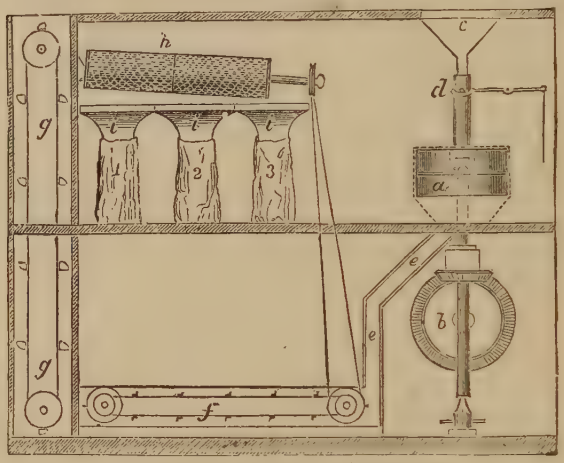


Fig. 3.—Elementary Section of a Flour-mill.

part of it large enough in the openings to let through the bran, which passed out at the end. Silk is now preferred to wire-cloth for dressing the flour. Hoppers, *i*, are placed below the dressing-machine, by means of which the flour and bran are filled into sacks, No. 1 being fine flour; No. 2, seconds; and No. 3, bran.

In a large and well-appointed mill, the wheat passes through a series of cleaning or smut-machines (consisting of rapidly revolving beaters inside an iron case) and through winnowing machines. After being slightly crushed between iron rollers and passed through a wire dressing or sifting machine, the wheat is crushed by 48 pairs (or other adequate number) of millstones. It is then sifted by means of silk cylinders—first to separate the bran, and a second time to separate the 'middlings' or 'parings.' What falls through the second set of silk machines is finished flour. The middlings are then subjected to a sifting process by means of 'middlings-purifiers.' These, which are horizontal sieves, are kept constantly in motion, and through them a current of air is made to pass by the suction of a fan. Thereafter, the middlings are ground by means of porcelain rollers, and

dressed through silk in the same way as the ground wheat, the flour thus obtained being mixed with that from the millstones. All the machinery is combined by means of elevators and screws in such a way that no manual labor is required for the conveyance of the material, from the time when it enters the mill as wheat to that at which it falls into sacks as flour, the process of manufacture occupying half an hour. One such great mill manufactures about 1,000 sacks of flour per day of 24 hours.

There is a form of mill in use for some purposes where the millstones are vertical, as shown in fig. 4, and called the edge-stone mill. It is sometimes, though rarely, used for grinding grain; but is much employed for crushing oil-seeds and for grinding dye-stuffs, sugar, chemicals, and a multitude of other substances. The stones are generally of some hard rock, such as granite or sandstone, and from 5 to 7 ft. in diameter. For such purposes as grinding clay or loam, they are usually made of cast-iron and of smaller size. The stones revolve in opposite directions, sometimes upon a fixed stone or metal bed, and at other times it is the bed-plate itself which revolves, and in so doing turns the edge-stones which rest upon it.

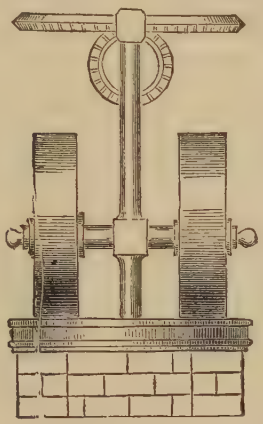


Fig. 4.—Edge-stone Mill.

Among recent improvements in flour-mills are: 1. The high-grinding system by means of rollers—either of chilled iron or of porcelain—in place of stones, suited to hard wheats, and carried out with great success in Hungary, particularly in Buda-Pesth, whence for many years have come the finest qualities of flours. Of late years, the millers of Minnesota have copied this system; and as they are favored by having a similar quality of wheat, they are successfully contesting the European markets with the Hungarians. 2. Middlings-purifiers (mentioned above), which vary very much in construction, but have the same leading principle—viz., making use of the difference of specific gravity of flour and bran, to effect a separation between them. By means of these machines, flour of very fine quality can now be made from material formerly used for feeding purposes. These middlings-purifiers are the leading feature in the American 'New Process' milling, now universally adopted in this country; and it is largely owing to the help of this apparatus that the Americans are now so keenly competing with foreign millers

MILL, JAMES: historian, political economist, and mental philosopher: 1773, Apr. 6—1836, June 23; b. in the neighborhood of Montrose, Scotland; son of a shoemaker. His mother was ambitious of a career for her son and resolved that he should have an education. He studied, with a view to the ministry, at the Univ. of Edinburgh, where he distinguished himself in Greek and in moral and metaphysical philosophy. He was licensed to preach 1798; but turned from the ministry and went to London 1802, where he settled as a literary man. He became editor of the *Literary Journal*, which after a time was discontinued; and wrote for various periodicals, including the *Eclectic* and the *Edinburgh Review*. In 1806 he commenced his *History of British India*, which with untiring industry he carried on with other literary work, and published in the winter of 1817–8. The impression produced by this masterly history on the Indian authorities was such that, 1819, the court of directors of the company appointed M. assistant-examiner of Indian correspondence, notwithstanding the unpopularity of his well-known radical opinions. The revenue dept. was assigned to his care and he continued its superintendence till four years before his death, when he was appointed head of the examiner's office, where he had control of all the departments of Indian administration —political, judicial, and financial—managed by the secret committee of the court of directors. Shortly after his appointment to the India house, he contributed to the *Encyc. Brit.*, 5th ed., the articles on government, education, jurisprudence, law of nations, liberty of the press, colonies, and prison discipline. These essays were reprinted in separate form, and became widely known. The powers of analysis, of clear statement, and of thorough application of principles, evinced in these articles, had probably never before been brought to bear on that class of subjects, whose treatment had been mainly empirical. In 1821–2 he published *Elements of Political Economy*, prepared primarily with a view to the education of his eldest son, John Stuart M. In 1829, his *Analysis of the Human Mind* appeared. His last published book was *Fragment on Mackintosh*, 1835. He was a contributor to the *Westminster Review* and to the *London Review*, which merged in the *London and Westminster*.

Not long after he settled in London, he made the acquaintance of Jeremy Bentham, and for a number of years lived during the summer in Bentham's country-house. Although he must have derived much benefit from his intercourse with the great law-reformer, he was not a mere disciple of Bentham, but a man of profound and original thought, as well as of great reading, in all departments of moral, mental, and political philosophy. His conversation was impressive, and he gave powerful intellectual stimulus to a number of young men, some of whom (including his own son, and Mr. Grote, historian of Greece) have risen to eminence. He took a leading

part in founding University College, London. He died at Kensington. See *Autobiography of John S. Mill*, the biography by Prof. Bain in *Mind*, 1876–78, and his *James Mill* (1882).

MILL, JOHN, D.D.: about 1645–1707, June 23; b. Shap, Westmoreland, England. He graduated from Queen's College, Oxford, 1669; was tutor there several years, and 1676 was appointed chaplain to the bp. of Oxford. In 1681 he became rector of Blechingdon, Oxfordshire, and chaplain to Charles II. He was appointed 1685 principal of St. Edmund's Hall, which position he held till his death, and 1704 became prebendary of Canterbury, to which office he was nominated by Queen Anne. The great work of his life, which he carried on at his own expense and to which he devoted 30 years, was an edition of the *Greek Testament, with Various Readings*, for which he collected from numerous sources more than 30,000 readings. In two weeks after its completion he died at Oxford. A reprint of his *Testament*, with additional readings, was issued Amsterdam, 1710.

MILL, JOHN STUART: social and political economist, logician, and mental philosopher: 1806, May 20—1873, May 8; b. London; son of James M., who educated him at home on a theory of his own. The boy was taught the Greek alphabet at the age of three, and by his eighth year had read Plato and many Greek books—probably with little real instruction from their contents, but with profitable intellectual discipline. In 1820 he went to France, where he lived for more than a year, making himself master of the French language, and occasionally attending public lectures on science. He lived for some time at Paris, in the house of the French economist, Jean Baptiste Say, where he made the acquaintance of many men distinguished then, or afterward, in letters and in politics. He spent part of his time in s. France, in the house of Sir Samuel Bentham, brother to Jeremy Bentham. During this stay in France, he laid the foundation of his great familiarity with, and interest in, the politics as well as the literature of the French nation. In 1823 he entered the India house, and became a clerk in the examiner's office, where his father was assistant-examiner. For 33 years he continued to be occupied in the dept. of the office named the Political, or the transactions of the E. India company with the native states. In 1831 he was appointed assistant-examiner, and 1856 was placed at the head of the department. He energetically opposed the transfer of the India government to the crown 1858. On account of failing health he declined a seat at the new Indian council, and retired from office 1858, Oct., on a compensating allowance. At the general election of 1865, M. was returned to parliament for Westminster; and till he lost his seat at the election of 1868, he acted with the advanced liberals. He died at Avignon, where he had spent most part of the last years of his life.

Mill became an author at a very early age, and is considered one of the foremost thinkers of his time. His first publications were articles in the *Westminster Review.* He was active in the political discussions that followed the revolution of 1830 in France, and the Reform-Bill movement in England; and 1835-40 was editor and, with Sir W. Molesworth, proprietor of the *London and Westminster Review,* where many articles of his own appeared. As political economist and mental philosopher Mill may be justly criticised as putting forth various untenable doctrines: his field was very broad, and he was not equally at home in all parts of it—a fact which he failed to note, especially in relation to the deeper spiritual experiences of the human soul. Moreover, his father's assiduous and severe training had been professedly aimed in Mill's childhood to develop in him an intellectual skepticism as his unchanging attitude of thought. Nevertheless his service to political economy has been very great, in setting economic inquiries in their proper scope and their due relations to social and governmental conduct, and in giving political economy such organization as is possible to it on the basis laid by Ricardo. Certainly Mill was an earnest intellectual seeker after truth, and a lover of clear thought; and as certainly his handling of any subject gave a profitable stimulus to the whole public mind.—In 1843 he published his *System of Logic,* in which the theory of induction received most notable scientific treatment; 1844, *Essays on some Unsettled Questions of Political Economy;* 1848, *Principles of Political Economy;* 1859, essay on *Liberty;* 1860, *Discussions and Dissertations;* 1863, *Utilitarianism,* the classical formulation of this ethical theory; 1865, *Comte and Positivism,* and the *Examination of Sir William Hamilton's Philosophy;* 1867 (when Mill was rector of St. Andrews University), his *Inaugural Address;* 1868, *England and Ireland;* 1869, *The Subjection of Women.* After his death appeared his *Autobiography* (1873), read with intense interest; *Three Essays on Religion* (1874); and a second volume of *Discussions and Dissertations* (1875). See Bains' *John Stuart Mill.*

MILLAIS, *mil-lā',* Sir JOHN EVERETT, Bart. R.A.: English painter: b. 1829, Southhampton; d. London 1896, Aug. 13. He entered the Royal Academy at 11, and in 1847 carried off the gold medal for his picture of *The Tribes of Benjamin seizing the Daughters of Shiloh,* exhibited, in the following year, at the British Institution. Before this period, he had acquired reputation among younger painters by his avowed antipathy to the principles of art which then prevailed. His views were shared by other students, such as Holman Hunt, Dante Rossetti (q.v.), and Charles Collins; and a sort of artistic fraternity was formed, which obtained the name *Pre-Raphaelite School.* Millais' principal paintings are: *Our Savior* (1850), *Mariana in the Moated Grange*

JOHN STUART MILL.

(1851), *The Huguenot* and *Ophelia* (1852), *The Order of Release* and *The Proscribed Royalist* (1853), *The Rescue* (1855), *Autumn Leaves* (1856), *The Heretic* (1858), *Spring Flowers* (1860), *The Black Brunswicker* (1861), *My First Sermon* (1863), *My Second Sermon* (1864), *Joan of Arc* (1865), *Sleeping, Waking, Jephtha* (1867), *Moses* (1871), *Chill October* (1871), *A Day Dream* (1874), *Sound of Many Waters* (1877), *The Princes in the Tower* (1878), etc. The pre-Raphaelitism, intenseness, and extreme anti-traditionalism of Millais' earliest years were gradually toned down; his mature skill shows remarkable force of color and breadth.

MILLAU', or MILLAUD'. See MILHAU.

MILLBURY, *mĭl'bĕr-ĭ:* town and railroad junction, Worcester co., Mass.; 6 m. s. of Worcester; on the New York, New Haven & Hartford and the Boston & Albany railroads. It has numerous churches, a high school, a library and two banks. The Blackstone river furnishes abundant water-power for its numerous and varied manufactures. Within the limits of the town are cotton and woolen mills, a foundry, lumber-mills, carriage and whip shops, and manufactories of cutlery, stockings, and shoes. Pop. (1900) 4,460.

MILLEDGE, *mĭl'ĕj,* JOHN: 1757—1818, Feb. 9; b. Savannah, Ga. He studied law, joined the colonists at the opening of the Revolution, and was one of the party that committed the first overt act of rebellion in the state by capturing the royal governor, Sir James Wright. He rendered excellent service in the army; became attorney general of Georgia 1780; served several terms in the legislature, three terms and part of a fourth in congress, and resigned to become governor of the state; was in the United States senate 1806-09, presiding over that body in the latter year. He was one of the founders and benefactors of the state university. The town of Milledgeville was named for him.

MILLEDGEVILLE, *mĭl'ĕj-vĭl:* city, capital of Baldwin co., Ga.; on the Oconee river and Georgia and Central of Georgia railroads; 85 m. s.e. of Atlanta, 145 m. w.n.w. of Savannah. It is near the geographical centre of the state; and streams nearby furnish natural drainage and water-power. The dam of the Oconee increases the water-power. The place was settled in 1803, received its city charter in 1836, and was named in honor of John Milledge (q.v.). From 1807 to 1867 it was the capital of the state, when it was superseded by Atlanta. It is the seat of the state lunatic asylum, the state penitentiary and the Georgia Military College, the Georgia Normal and Industrial College, and a State School for Girls; contains the former state capitol (now the military college) and governor's mansion; had its public buildings burned by General Sherman's army 1864. Pop. (1900) 4,219.

MILLEDOLER, *mĭl′dol-ẽr*, PHILIP, D.D.: 1775, Sep. 22 —1852, Sep. 23; b. Rhinebeck, N. Y. He graduated from Columbia College 1793, studied theology, was settled 1795 over the Nassau st. German Ref. Chh., New York, where he preached in German and English; became pastor 1800 of Pine st. Presb. Chh., Philadelphia, and 1805 of the Rutgers st. Presb. Chh., New York. In 1813 he was settled over the Collegiate Ref. Dutch Chh., New York, and remained its pastor till 1825, when he became prof. of theology in the seminary at New Brunswick and pres. of Rutgers College, which offices he held till 1841. He was a powerful preacher and was specially gifted in public prayer. He was prominent in founding the American Bible Soc.; moderator of the Presb. General Assembly 1808, and pres. of the General Synod of the Ref. Church 1823. The last 10 years of his life were spent in retirement. He died on Staten Island, N. Y.

MILLEFOIL: see MILFOIL.

MIL′LENARY PETI′TION: see HAMPTON COURT CONFERENCE.

MILLENNIUM, n. *mĭl-lĕn′ĭ-ŭm* [L. *millĕ*, a thousand; *annus*, a year]: long, indefinite, final period or age (vaguely, a thousand years) in the world's history, which, as some students of the prophetic Scriptures maintain, is to be introduced by the second coming of Christ, who is to administer his kingdom in visible presence on the earth during the millennial age; in which period also Satan will be bound. MILLENARIAN, a. *mĭl′lĕ-nā′rĭ-ăn*, consisting of a thousand; millennial: N. one who believes in the millennium. MIL′LENA′RIANISM, n. *-rĭ-ăn-ĭzm*, doctrine of the millenarians. MILLENARY, a. *mĭl′lĕn-ăr-ĭ*, consisting of a thousand: N. the space of one thousand years. MILLENNIAL, a. *mĭl-lĕn′nĭ-ăl*, pertaining to the millennium or one thousand years. MILLEN′NIALIST, n. *-ĭst*, one who believes that Christ will reign on the earth in visible person for one thousand years.—The *Millennium*, as a period of great advancement, prosperity, and general triumph of the gospel among men, is expected by multitudes who are not millenarians, since they do not accept a principle fundamental in millenarian belief—that the second coming of Christ, with the 'first resurrection' of the righteous dead and the 'translation' of the righteous living, will precede and introduce the millennial reign. As more definitely denoting this millenarian view, it is frequently termed *pre-millenarianism*—with reference to the visible coming of Christ *before* the millennium.

The idea of a M. originated proximately in the Messianic expectations of the Jews; but more remotely, it has been conjectured, in the Zoroastrian doctrine of the final triumph of Ormuzd over Ahriman; and later it was connected by the Christians with the *Parousia*, or second coming of Christ. The notion of a golden age, preserved by the converts from heathenism to Christianity, as well as the oppression and persecutions to

which they were long subjected by the state authorities, would naturally tend to develop and strengthen such hopes. The chief basis of the millenarian idea in Judaism as well as in Christianity, however, is the ardent hope for a visible divine rule upon earth, and the identification of the church with that of which it is merely a symbol. In the 1st c. of the church, millenarianism (the Greek equivalent of which, *chiliasm*, from *chilioi*, a thousand, is the term employed by the Fathers) was a widespread belief, to which the Book of Daniel, and more particularly the pictorial predictions of the Apocalypse (chaps. xx. and xxi.), gave an apostolical authority; while certain prophetical writings, composed at the end of the 1st and the beginning of the 2d c.—e.g., the *Testament of the Twelve Patriarchs*, the *Fourth Book of Esdras*, the *Revelation of St. Peter*, etc.; also the *Christian Sibylline Books*, the *Epistle of Barnabas*, the *Shepherd of the Pseudo-Hermas*, several Midrashim, Targums, and other works partly legendary embodied in the *Talmud*—lent it a more vivid coloring and imagery. The unanimity which the early Christian teachers exhibit in millenarianism proves how strongly it had laid hold of the imagination of the church, to which, in this early stage, immortality and future rewards were to a great extent things of this world as yet. Not only the heretic Cerinthus, but even the orthodox doctors—e.g., Papias, bp. of Hierapolis, Irenæus, Justin Martyr, etc.—delighted themselves with dreams of the glory and magnificence of the millennial kingdom. The *Sibylline Books*, for instance, hold that the earth will be cultivated throughout its length and breadth, that there will be no more seas, no more winters, no more nights; everlasting wells will run honey, milk, and wine, etc. Papias, in his collection of traditional sayings of Christ (*Kuriakōn Logiōn Exēgēseis*), indulges in the most monstrous representations of the rebuilding of Jerusalem, and the colossal vines and grapes of the millennial reign. Every vine will bear 10,000 branches, every branch 10,000 shoots, every shoot 10,000 sprigs, every sprig 10,000 bunches, every bunch 10,000 berries, every berry 36 times 25 gallons of wine; and if a saint come to pluck a berry, they will all cry out: 'Pluck me, O Saint, I am better, and praise the Lord through me.' The Talmud calculates the height of the men of the M. to be, as before the Fall, 200–900 yards; the moon shall be, according to a prophetical dictum, like the sun; the sun shall be increased 343 times; and every Israelite will beget as many children as there were Israelites going out from Egypt—60,000. Each grape will be large enough to fill the biggest ship. Above all, however, the land of Israel will be free again, and the primitive worship restored with unheard-of splendor. 'Such a chiliasm,' Neander justly remarks, could only 'promote a fleshly eudaimonism;' and, indeed, ere long it called into more energetic activity the opposition of Gnostic spiritualism. According to the general opinion, which was as much Christian as

Jewish, the M. was to be preceded by great calamities, reminding us in some degree of the Scandinavian Ragnarök (or 'Twilight of the Gods'). The personification of evil appeared in *Antichrist*, the precursor of Christ (identified, during the 1st c., with Nero), who would provoke a frightful war in the land of Magog (Ezek. xxxviii., xxxix.), against the people Gog, after which the Messiah—some say a double Messiah: one, the son of Joseph, vanquished in the strife (see MESSIAH); the other, the victorious son of David—would appear, heralded by Elias, or Moses, or Melchizedek, or Isaiah, or Jeremiah, and would bind Satan for a thousand years, annihilate the godless heathen or make them slaves of the believers, overturn the Roman empire, from the ruins of which a new order of things would spring forth, in which the 'dead in Christ' would arise, and with the surviving saints enjoy an incomparable felicity in the city of the 'New Jerusalem,' which was expected to descend literally from heaven. To the innocence which was the state of man in Paradise, there were added, in the prevalent notions of the M., the finest physical and intellectual pleasures.

In the Mosaic account of creation, we find the primitive ground for making the victorious era of the church last a thousand years. That account was regarded by the Jews and by the Judaic Christians as a type of the destinies of creation. Now, by a strictly literal interpretation of the 4th verse of Ps. xc., it was supposed that a day of God was arithmetically equal to a thousand years; hence the six days of creation were understood to indicate that the earth would pass through 6,000 years of labor and suffering, to be followed by a seventh day—i.e., 1,000 years of rest and happiness. In the Book of Revelation (xx.) this view is presented. Still, the rabbinical traditions differ widely among themselves as to the duration of the happy period. Instead of 1,000 years, some of them count 40, 70, 90, 365, 400, 600, 2,000, or 7,000, or so many years as have elapsed from the creation of the world or the flood. The Gospel of Nicodemus makes it 500 years, etc. In fact, the systems of apocalyptic chronology were of varied and arbitrary cast, according as their originators laid greater stress on the Apocalypse, the Book of Daniel, the Song of Songs, the Jewish 'Gematria,' or Computation of Letters—a very pliable art in itself—or on astronomy, astrology, 'natural phenomena,' and the like.

The lapse of time, chilling the ardor of the primitive Christian belief in the nearness of the *Parousia*, had without doubt also the tendency to give a more shadowy, and therefore a more spiritual, aspect to the kingdom over which the expected Messiah was to reign. The influence of the Alexandrian philosophy contributed to the same result. Origen started the idea that, instead of a perpetual opposition of paganism to Christianity—instead of a final and desperate conflict between the two—instead of an insolent triumph on the part of the saints, and a

servile submission on the part of the unbelievers, the real progress and victory of Christianity would consist in the gradual spread of the truth throughout the world, and in the voluntary homage paid to it by all secular powers. This was an immense advance on the views previously entertained. It is owing largely to Origen and his disciple Dionysius that more spiritual conceptions of the M. finally established themselves in the church; at all events, they furnished the Fathers with the majority of their arguments. Yet even in the Egypto-Alexandrian Church, millenarianism in its most literal form (not the more spiritualized millenarianism which in our day expresses the longing hope of many eminent Christians) was widely diffused, and was eradicated only by the great wisdom and moderation of Dionysius. The Montanists (q.v.) generally, as might be expected from the enthusiastic tendencies of the sect, were extreme millenarians or chiliasts, and, being considered a heretical sect, contributed largely to bring Chiliasm into discredit; or, at all events, their own carnal form of chiliasm, which Tertullian himself attacked. Caius, the presbyter, in his *Disputation* against the Montanist Proclus, traces the origin of that form to the hated heretic Cerinthus, whom he accuses of forging a certain revelation, which he passed off as the work of an apostle. From his description of this revelation, it is almost certain —strange as it may appear—that Caius is alluding to the canonical Apocalypse. Lactantius, in the beginning of the 4th c., was the last important church Father who indulged in chiliastic dreams; among its earlier advocates were Nepos, Methodius, Korakion, Apollinarius, Victorinus, etc. In the 5th c., St. Jerome and St. Augustine expressly combated certain fanatics who still hoped for the advent of a millennial kingdom whose pleasures included those of the flesh. But from this time the church formally rejected millenarianism in its sensuous 'visible' form, though the doctrine every now and then made its reappearance suddenly and obstinately, especially as a general popular belief. Thus the expectation of the *Last Day* in the year 1,000 reinvested the doctrine with a transitory importance; but it lost all credit again when the hopes so keenly excited by the Crusades faded away before the stern reality of Saracenic success, and the predictions of the *Everlasting Gospel*, a work of Joachim de Floris, Franciscan abbot (died 1212), remained unfulfilled.

At the period of the Reformation, millenarianism once more experienced a partial revival, because it was not difficult to apply some of its symbolism to the papacy. The pope, e.g., was *Antichrist*—a belief still retained in some extreme Protestant creeds. Yet the doctrine was not adopted by the great body of the Reformers, but by some fanatical sects, such as the Anabaptists, and by the Theosophists of the 17th c. Also during the civil and religious wars in France and England, when excitement prevailed, it was prominent. The *Fifth Monarchy Men*

of Cromwell's time were millenarians of the most exaggerated and dangerous sort. Their peculiar tenet was, that the M. *had* come, and that *they* were the saints who were to inherit the earth. The excesses of the French Rom. Cath. mystics and Quietists terminated in chiliastic views. Among the Protestants, it was during the Thirty Years' War that the most enthusiastic and learned chiliasts flourished. These may—broadly—be brought under the three chief heads of *Exegetical* Chiliasts, who, by some biblical dates, endeavored to compute the predicted time; *Alchemistic* or *Cabalistic* Chiliasts, who endeavored to hasten the period by some mystical discovery; and *Politico-theocratic* Chiliasts, who wished to reduce the governments of the world to a biblical standard: see ANABAPTISTS: MÜNZER. The awful suffering and widespread desolation of that time led pious hearts to solace themselves with the hope of a peaceful and glorious future. Since then the predilection which has sprung up for expounding the prophetical books of the Bible, and particularly the Apocalypse, with a view to present events, has given the doctrine a faint semi-theological life, very different, however, from the earnest, practical faith of the first Christians. Among the foremost chiliastic teachers of modern centuries are Ezechiel Meth, Paul Felgenhauer, Bp. Comenius (*Lux in Tenebris*, 1657), Prof. Jurieu (*L'Accomplissement des Prophéties*, 1686), Serarius (*Assertion du Regne de Mille Ans, etc.*, abt. 1670), Poiret (*Economie Divine*, 1687), J. Mede (*Clav. Apocal*, 1627). Thomas Burnet and W. Whiston endeavored to give chiliasm a geological foundation, but without finding much favor. Spener, on account of his *Hoffnung besserer Zeiten*, has been deemed a chiliast; no less Joachim Lange (*Licht und Recht*); and Swedenborg employed apocalyptic images to set forth the transfigured world of the senses. Latterly, especially since the rise and extension of missionary enterprise, the opinion has obtained wide currency that, after the conversion of the whole world to Christianity, a blissful and glorious era will ensue; but not much stress—except by extreme literalists—is now laid on the nature or duration of this far-off felicity. In fact, the common vague Christian conception of a M. without a visibly present Christ, as held at the present day, is little different, so far as results are concerned, from the belief of philosophers in the perfectibility of the race. The essence of both conceptions is the cessation of sin and sorrow, the prevalence of holiness and happiness. But this departs widely from the 'ancient hope of the church'—a kingdom of visible majesty, with Jesus and the saints ruling the world from Jerusalem, the central city of the earth.

In quite recent years an enthusiastic millenarianism of the more spiritual type has seized on some men in Britain, and still more in the United States, who are held in high honor in their various denominations. What they lack in numbers, they make up in fervor. At least their argument and appeal have done the modern church

this service—they have called attention to a range of sublime but dim truths which have become an almost forgotten heritage from the early church. It is probable that the great body of Christian thinkers on this theme are not at rest in either the common or the millenarian theory. Probably, in the words of a recent writer, 'it is felt that while the strict pre-millennial view, from a flat literal interpretation of a few texts, tends toward an external and materialistic handling of noble spiritual facts, the opposite and usual view tends toward dissolving all spiritual facts in a vast sea of symbolism, and this on a principle of interpretation by which almost any words in Scripture can be turned to almost any meaning. The usual expedient of seeking a third view carefully limited between the two extremes, and antagonizing both, seems scarcely feasible in this case. The truth, when found, will probably be not between, but *combining*, both—not so much rejecting either as solvent and comprehensive of both in some more vital range of thought.'

Great eagerness and not a little ingenuity have been exhibited by many persons in fixing a date for the commencement of the M. The celebrated theologian, Johann Albrecht Bengel (*Erklärte Offenbarung: Reden für's Volk*), who, in the 18th c., revived an earnest interest in the subject among orthodox Protestants, asserted from a study of the prophecies that the millennium would begin 1836. This date was long popular. Bengel's general millenarianism was adopted by Oetinger (d. 1782), and widely spread throughout Germany, in a more or less poetic form, by Hahn, Crusius, Jung Stilling, Lavater, and Hess (*Briefe über die Offenb. Joh.*). Some of the greatest of the more recent German theologians are millenarians, such as Rothe, Delitzsch, Hoffmann, Kurtz, Hebart, Thiersch, Nitzsch, P. Lange, and Ebrard. Swedenborg held that the last judgment took place 1757, and that the New Church, or 'Church of the New Jerusalem,' as his followers designate themselves—in other words, the millennial era, then began. In the United States considerable agitation was excited by the preaching of William Miller (q.v.), who fixed the second advent of Christ about 1843. Of late years, the most noted English millenarian was Dr. John Cumming, who originally placed the end of the *present dispensation* 1866 or 7; but as that time drew near without any millennial symptoms, he was understood to have modified his original views considerably, and came to the belief that the beginning of the M. will not differ so much, after all, from the years immediately preceding it as people commonly suppose. See Corrodi's *Kritische Geschichte des Chiliasmus* (Zurich, 1794, 4 vols.); Calixtus, *De Chiliasmo* (1692, 4to); Klee, *De Chiliasmo* (1825); Schürer's *Neutestamentliche Zeitgeschichte* (1874); and the standard handbooks of the history of Dogma. A really good history of millenarianism, however, is as yet a desideratum.

MILLEPEDE, n. *mĭl'lĕ-pēd*, MILLEPEDES, n. plu. *mĭl'-lĕ-pēdz* or *mĭl-lĕp'ĕ-dēz* [L. *millĕ*, a thousand; *pedem*, a foot]: popular name of many kinds of *Myriapoda*, of order *Chilognatha*, and chiefly of families *Julidæ* (see JULUS) and *Polydesmidæ*. In the latter family, the feet are arranged in numerous groups along both sides; otherwise they much resemble the *Julidæ*. The largest species of these articulate animals are found in warm climates, and some are brightly colored; but small species of both families are common in temperate regions, and some, as *Polydesmus complanatus*—which is lilac-colored, flattened, and from a quarter to half an inch in length—are very destructive to roots of plants. Doubt has been expressed if they attack roots perfectly healthy; but, at all events, they take advantage of incipient decay, and greatly extend and accelerate it. The application of salt, lime, nitrate of soda, etc., has been often recommended as preventive of their ravages.—The name PILL MILLEPEDE is often given to those shorter *Chilognatha*, of the family *Glomeridæ*, which, when disturbed, roll themselves up into an almost globular form, like the crustacean called armadillo. *Note.*—The *millepede* has two pairs of limbs to each joint; the *centipede* has but one.

MILLEPORA, n. plu. *mĭl'lĕ-pō'rā*, or MIL'LEPORI'DÆ, n. plu. *-rī'dē*, and MIL'LEPORES, n. plu. *-pōrz* [L. *millĕ*, a thousand; *porus*, a pore]: in *geol.*, genus and family of hydrozoa, contributing largely to the formation of branching corals, whose cells or pores are extremely numerous and minute. MIL'LEPO'RITE, n. *-rīt*, a fossil millepore.—*Millepores* are by recent observers thought to be of two kinds of animals: the larger, gastrozoöids, occupy the larger tubes of the coral skeleton; the smaller, dactylozoöids, occupy the smaller tubes around the larger. The smaller have no mouth, but with their tentacles they catch food for the larger, which have mouth and stomach, and who digest for the whole colony a nutritive fluid which is then distributed to every part by a ramifying system of minute ducts.

MILLER, ALFRED BRASHEAR: American Presbyterian clergyman and educator: b. Brownsville, Pa., 1829, Oct. 16; d. Waynesburg, Pa., 1902, Jan. 20. After obtaining his preparatory education in various schools, he graduated from Waynesburg College in 1853, becoming professor of mathematics there, and remaining in that position until 1858. In 1859 he became president of the college and served as such till 1899 when he became president emeritus. He was for 10 years pastor of the Cumberland Presbyterian church at Waynesburg and also edited the *Cumberland Presbyterian* (1864-8). He published *Doctrines and Genius of the Cumberland Presbyterian Church* (1892).

MILLER, ALFRED JACOB: American painter: b. Baltimore, Md., 1810; d. 1874. He studied under Thomas

Suily, and in Europe, where he made successful copies of the old masters. Accompanying Sir William Drummond Stewart to the Rocky mountains, he painted many striking pictures of the scenery, which are now in Murthley Castle, Scotland. He also executed numerous portraits.

MIL'LER, ANNA JENNESS: American author and lecturer: b. New Hampshire. She is most widely known as an advocate of correct principles of physical development and dress for women; she is also interested in the æsthetic side of life, and is a student of art and a collector of paintings and curios. She was for many years editor and proprietor of the *Jenness Miller Monthly*, in which she advocated her views; and has given over 1,000 lectures in the United States and Canada on physical culture and dress. She has also designed a costume for women which she claims fulfils the requirements of both hygiene and art. She has published *Barbara Thayer* (1884); *Twixt Love and Law; Mother and Babe* (1892); *How to Finish and Furnish a Home* (1892); *Creating a Home* (1896); *Physical Beauty; Philosopher of Driftwood; Mother's Health and Baby's Welfare* (1905); etc.

MILLER, CHARLES HENRY: American landscape painter: b. New York 1842, Mar. 20. He was educated in medicine at the New York Homœopathic College and subsequently studied art at the Royal Academy of Bavaria in Munich. In 1873 he became an associate of the National Academy of Design and an Academician in 1875. He is especially noted for his studies of Long Island scenery and has exhibited at very many important national and international exhibitions. Among his works may be cited: *Autumn at Creedmoor Oaks; A Gray Day on Long Island; Moonlight Near Great South Bay; Long Island Meadows; A Frosty Day on Long Island; The Springfield Mill Pond.* He has published under the signature of 'Carl de Muldor,' *The Philosophy of Art in America* (1885).

MILLER, CHARLES RANSOM: American journalist: b. Hanover, N. H., 1849, Jan. 17. He was graduated from Dartmouth College in 1872 and became a journalist. In 1872-5 he was with the Springfield *Republican* and since then has been on the staff of the New York *Times*, where he was editorial writer in 1881-3 and is now editor-in-chief.

MILLER, CINCINNATUS HEINE, better known as 'JOAQUIN MILLER': American poet, whose pseudonym is due to his defense of Joaquin Murietta, a Mexican bandit: b. Wabash district, Ind., 1841, Nov. 10. His father took him to Oregon in 1854. He got a little schooling but soon ran away from home; went to the California gold mines; accompanied Walker on the Nicaragua filibustering expedition; lived familiarly among the Indians and the Spaniards of the Pacific slope; studied law for

a few years, having graduated at Columbia College, Oregon, in 1858; practiced law unsuccessfully in Idaho, where he soon turned express messenger, and in 1863 settled in Oregon for a short time, becoming editor of the Eugene City *Democratic Register*, which was suppressed in the same year because of its treasonable character. In 1864 he began to practice law in Cañon City, Ore., made himself popular by his services against the warlike Snake Indians, and from 1866 to 1870 was judge of Grant co. His writings, collected under the title of *Songs of the Sierras*, he could not sell in the east, and so took them to London, where they were published and brought him great fame. He visited London again in 1873; lived in Washington, D. C.; and in 1887 returned to California, settling near Oakland. His life sums up the adventure of the Pacific slope, and his verse and fiction are to be prized especially on this account as being real 'documents' of certain phases of American life. They are, moreover, fresh, vigorous, and original in style; his metre is free and powerful; and his narrative forcible. He excels, perhaps, in his pictures of Nature. In a few short lyrics there is a quiet melancholy, bred of communion with solitary wood and mountain. But on the whole he is not a great artist, although his work has a distinct value as descriptive of various American types. Hence his fame has been much greater in England, where he was even styled 'the American Byron,' than in America. Miller's works include: *Songs of the Sunlands* (1873); *Songs of the Desert* (1875); *Songs of Italy* (1878); *Collected Poems* (1882); *Songs of Mexican Seas* (1887); *The Baroness of New York* (1877); *The Danites in the Sierras* (1881; later in the form of a play); *'49, or the Gold-Seekers of the Sierras* (1884); *Pacific Palms; Life Among the Modocs; The One Fair Woman; The Destruction of Gotham; Chants for the Boer* (1900); *True Bear Stories* (1900); etc.

MIL'LER, EDWARD, M.D.: 1760, May 9—1812, Mar. 17; b. Dover, Del. He obtained a medical education at the Univ. of Penn. and in a hospital at Basking Ridge, N. J.; served in the revolutionary war as surgeon's mate; went to France 1782 on a war-vessel, and practiced medicine 1783-96 in Dover. In the latter year he removed to New York, where, 1799, he became one of the founders of the *Medical Repository*, the first medical journal published in America. He was appointed New York city physician 1803, medical professor in the University of New York 1807, and clinical lecturer in the New York Hospital 1809. He assisted his brother, the Rev. Samuel Miller, in the preparation of a *Brief Retrospect* published by the latter, and wrote a *Report on the Yellow Fever in New York in 1805*, in which he claimed that the disease is non-contagious, and which still holds a high place in medical literature. He was a strong temperance advocate and earnestly opposed the use of tobacco in any

form. As a practitioner he was one of the most successful of his time. He died at New York. His medical works, edited by his brother, who also furnished a biographical sketch, were published 1814.

MILLER, EMILY HUNTINGTON: American author and educator: b. Brooklyn, Conn., 1833, Oct. 22. She was graduated from Oberlin College, Ohio, in 1857, and was married to J. E. Miller (d. 1882) in 1860. She was editor of a juvenile magazine, *The Little Corporal*, afterward merged in *St. Nicholas*, and in 1891-8 was dean of the Woman's College of Northwestern University. She has written: *From Avalon and Other Poems* (1896); *Fighting the Enemy; Helps and Hindrances; Songs from the Nest; Captain Fritz; The King's Messengers; Thorn Apples; Highways and Hedges; For the Beloved* (poems); etc.

MILLER, FLORENCE FENWICK: English doctor, lecturer and author: b. 1854, Nov. 5. She entered the Ladies' Medical College, London, in 1871; gained a wide practice and did much charity work; was thrice a member of the London school board; and is a prominent advocate of women's suffrage. She married Frederick A. Ford in 1877, but kept her maiden name. She wrote: *The House of Life* (1879); *Physiology for Schools* (1880); *Atlas of Anatomy* (1880); *Readings in Social Economy* (1883); *Life of Harriet Martineau* (1884); and *In Ladies' Company* (1892), as well as letters over the signature 'Filomena' for the London *News* and for various provincial papers.

MILLER, HARRIET MANN ('OLIVE THORNE MILLER'): American ornithological writer: b. Auburn, N. Y., 1831, June 25. Her earliest writings were signed 'Olive Thorne,' and after her marriage to W. T. Miller in 1849 she added her husband's name to her signature. She began her study of birds in 1880 and has published for young people's reading: *Little Folks in Feathers and Fur* (1879); *Little People of Asia* (1882); *In Nesting Time* (1888); *Little Brothers of the Air* (1892); *A Bird-Lover in the West* (1894); *Our Home Pets* (1894); *Four Handed Folk* (1896); *Under the Tree Tops* (1897); *The First Book of Birds* (1899); *The Second Book of Birds* (1901); *True Bird Stories* (1903); *With the Birds in Maine* (1904); *Kristy's Queer Christmas* (1904); *Kristy's Surprise Party* (1905); *Kristy's Rainyday Picnic* (1906); *What Happened to Barbara* (1907); *Harry's Runaway and What Came of It* (1907); etc.

MIL'LER, HENRY: 1751, Feb. 12—1824, Apr. 5; b. near Lancaster, Penn. He was admitted to the bar when about 20 years of age, joined the continental army 1775, with a company which he had helped organize and of which he was 1st lieutenant; reached Cambridge July 25, and rendered efficient service. He was promoted captain, was prominent at the battle of Long Island, made major

1777, and the following year lieutenant-colonel. He took part in about 50 battles. He retired from the army 1779, on account of the financial troubles of his family; was high sheriff of York county 1780-83, served in the Pennsylvania legislature 1783-85, and was a member of the state constitutional convention 1790. In 1794, he was appointed quartermaster-general of the expedition against the whisky insurrection. He afterward became a merchant in Baltimore, and in the war of 1812 was commissioned brigadier-general. Returning to Penn., he was prothonotary of Perry county 1821, till he died at Carlisle.

MIL'LER, HENRY, M.D.: 1800, Nov. 1—1874, Feb. 8; b. Lexington, Ky. He was educated at Lexington, where he obtained a license as a physician; practiced medicine a short time in Glasgow, and then removed to Harrodsburg. Here he remained till the opening of the medical university in Louisville, in which, 1835-69, he was professor of obstetrics and the diseases of women and children. In the latter year he was made professor emeritus. He was elected, 1859, president of the American Medical Assoc. His books, *A Treatise on Human Parturition*, 1844, and *The Principles and Practice of Parturition*, 1858, were accepted as standard publications. He contributed many valuable articles to the medical journals of the day. Dr. Miller died at Louisville.

MIL'LER, HUGH: distinguished geologist and writer: 1802, Oct. 10—1856, Dec 23-24; b. Cromarty, in n. Scotland; descended from a family of sailors, and losing his own father by a storm at sea when he was only five years of age. In consequence of this misfortune, he was brought up chiefly under the care of two of his mother's brothers, one of whom ('Uncle Sandy') imbued him with a taste for natural, and the other ('Uncle James') for traditional, history. He acquired good knowledge of English at Cromarty Grammar School. Before his 11th year he had read those romances of childhood, *Jack the Giant-killer, Jack and the Bean-stalk, Sindbad the Sailor, The Yellow Dwarf,* and *Aladdin and the Wonderful Lamp,* besides several works of higher literary pretensions. As he grew older, he became extremely fond of the great English poets and prose writers. From his 17th to his 34th year, he worked as a common stonemason, devoting his leisure hours, chiefly in the winter months, to independent researches in natural history, to the extension of his literary knowledge, and to writing, for which he had a passion. In 1829, he published a volume, *Poems written in the Leisure Hours of a Journeyman Mason,* followed after a few years by *Scenes and Legends of the North of Scotland.* Miller soon decided that poetry was not his field. His attention was soon drawn to the ecclesiastical controversies which were agitating Scotland, and his famous *Letter to Lord Brougham,* on the 'Auchterarder Case,' brought him into public no-

tice. In 1840, he went to Edinburgh as editor of the *Witness*, a newspaper started in the interest of the non-intrusion party in the Church of Scotland; and, in the course of the same year, published in its columns a series of geological articles, afterward collected under the title of *The Old Red Sandstone, or New Walks in an Old Field.* These articles were very remarkable, both in a scientific and literary view. They contained a minute account of the author's discovery of fossils in a formation believed, until then, to be destitute of them, and written in a style which was a rare and harmonious combination of strength, beauty, and polish. At the meeting of the British Assoc. in the same year (1840), he was warmly praised by Murchison and Buckland; indeed, his discoveries were the principal topic of discussion among the savants. His editorial labors during the heat of the Disruption struggle were immense, and so seriously injured his health that for some time he had to give up literary activity. About 1846 he resumed his pen, and became the most vigorous and eloquent writer in the service of the newly constituted Free Church. After ten years of hard, fagging toil, his brain gave way, and, in a moment of aberration, he put an end, by a pistol-shot, to his own existence, at Portobello, near Edinburgh. Miller's principal works, besides those above mentioned, are: *First Impressions of England and its People; Footprints of the Creator, or the Asterolepis of Stromness,* designed as a reply to the *Vestiges of the Natural History of Creation; My Schools and Schoolmasters, or the Story of my Education* (greatly admired); and *Testimony of the Rocks,* an attempt to reconcile the geology of the Pentateuch with the geology of nature, by the hypothesis that the days mentioned in the first chapter of Genesis represent not the actual duration of the successive periods of creation, but only the time occupied by the unrolling of a directly inspired panoramic vision of these periods before the eyes of Moses.

Miller's services to science were great, but he is even more distinguished as a man of genius and as one of the best writers of his time. Of *The Old Red Sandstone,* Buckland said that 'he would give his left hand to possess such powers of description as this man.' As a man, he was honest, high-minded, earnest, and hugely industrious, a true Scot, a hearty but not a sour Presbyterian (for he loved Burns as much as he revered Knox). Scotland may well be proud of 'the stone-mason of Cromarty.' Besides his autobiography quoted above, see Life by Peter Bayne (2 vols. 1871).

MIL'LER, JAMES: 1776, Apr. 25—1851, July 7; b. Peterborough, N. H. He obtained a legal education, became major in the U. S. army 1808, and lieutenant-colonel 1810. He was made brevet-colonel for gallant service as commander at the battle of Brownstown; was prominent in the battles of Fort George, Chippewa, and

Lundy's Lane, by a brilliant assault deciding the latter conflict in favor of the Americans. As a recognition of his services in the war of 1812, he was breveted brigadier-general, and was presented with a gold medal by congress. He was governor of the territory of Arkansas 1819-25, and from the latter date to 1849 was collector of the port of Salem, Mass. He died at Temple, N. H.

MILLER, JAMES RUSSELL, D.D.: American Presbyterian clergyman and author: b. Harshaville, Pa., 1840, Mar. 20. He was graduated from Westminster College, New Wilmington, Pa., in 1862, and has held several important pastorates. He is editor of the Presbyterian Board of Publication, and among his very numerous books are: *Week-Day Religion* (1880); *The Marriage Altar* (1888); *Building of Character* (1894); *To-day and To-morrow* (1902); *In Perfect Peace* (1902); *The Lesson of Love* (1903); *The Face of the Master* (1903); *Our New Edens* (1904); *The Inner Life* (1904); *Beauty of Kindness* (1905); *When the Song Begins* (1905); *The Best Things* (1907); *Glimpses of the Heavenly Life* (1907); *Morning Thoughts for Every Day in the Year* (1907); etc.

MIL'LER, JOAQUIN. See MILLER, CINCINNATUS HEINE.

MIL'LER, JOHN FRANKLIN: 1831, Nov. 21—1886, Mar. 8; b. South Bend, Ind. He studied law, and from 1855 practiced in South Bend, and entered politics. He resigned 1861 the position of state senator, entered the Union army, organized a regiment, was repeatedly promoted for gallant service, and became brevet major-general of volunteers 1865. He was collector of the port of San Francisco, organized the Alaska commercial fur company, served three times as republican presidential elector, was member 1879 of the Cal. constitutional convention, and from 1881 till his death was a prominent member of the U. S. senate. He died in Washington.

MIL'LER, JOSEPH: jester: known as JOE MILLER (q.v.).

MILLER, JOSEPH NELSON: American naval officer: b. Ohio, 1836, Nov. 22. He entered the navy in 1851, and at the time of the outbreak of the civil war held the rank of lieutenant, and was promoted lieutenant commander in 1862. As executive officer of the Passaic he had part in the attack upon Fort McAllister and Fort Sumter, and in the two attacks upon Fort Fisher as executive officer of the Monadnock; and received commendation from his commanding officers for bravery and skill in these engagements. In 1870, he was promoted to the rank of commander, and in 1875 was assigned to the Tuscarora, and had charge of the deep sea soundings between the Hawaiian and the Fiji Islands. He obtained the rank of captain in 1881, commodore in 1894, and rear-admiral in 1897. In the latter year as commander-in-chief of the Pacific stations he hoisted the American flag at Honolulu, and in 1898 again raised the flag there, when American

sovereignty of Hawaii was established. In 1897, he was the representative of the United States navy at Queen Victoria's jubilee, with the Brooklyn as flagship; and during the Spanish war (1898) he organized the naval reserves on the Pacific coast. He was retired from active service in 1898, Nov.

MILLER, LEWIS: American inventor and philanthropist: b. Greentown, Ohio, 1829; d. New York, 1899, Feb. 17. He was a machinist, settled at Canton, Ohio, where he made agricultural tools, many of them after his own designs, notably the first successful reapers and binders; and later had factories at Akron and Mansfield. In Akron he built a model Sunday school, and he gave much money for Sunday-school work throughout the country. He planned the Chautauqua Assembly and was its president from 1874 until his death.

MILLER, MERRILL: American naval officer: b. Bellefontaine, Ohio, 1842, Sep. 13. He was appointed to the United States Naval Academy in 1859 and upon the outbreak of the civil war was assigned to active duty. He was in the Mississippi squadron in 1862-3, was at the battles of Arkansas Post, Haines' Bluff, the siege of Vicksburg, and in 1864-5 was with the North Atlantic squadron. He continued in the navy after the war in different stations, was promoted captain in 1893 and rear-admiral 1900, July 1; was in command of United States receiving-ship Vermont 1897-1900; commandant at the Mare Island Navy Yard 1900-3, and of the Pacific naval district 1903-4; and was retired 1904, Sep. 13.

MIL'LER, SAMUEL, D.D.: 1769, Oct. 31—1850, Jan. 7; b. Dover, Del. After graduating from the Univ. of Penn. 1789, he studied theology, received a license to preach 1791, and became, 1793, a colleague of Drs. Rodgers and McKnight in the pastorate of the 1st Presb. Church in New York. He was professor of ecclesiastical history 1813-49 in the Princeton Theol. Seminary. He was one of the leading men in his denomination, a prolific author, an uncompromising Calvinist, and was prominent in the discussions which preceded the division of the Presb. Church into the old and new schools. Although much of his writing was controversial, he was uniformly kind and courteous. Among his published works were *A Brief Retrospect*, in the preparation of which he was assisted by his brother, EDWARD MILLER (q.v.); *Letters on Unitarianism, Letters on Clerical Manners and Habits, Letters to Presbyterians*, and the *Life of Jonathan Edwards*, in Sparks's *American Biography*. He died at Princeton.

MIL'LER, SAMUEL FREEMAN: b. Richmond, Ky., 1816, Apr. 5; d. Washington, 1890, Oct. 13. He studied medicine at Transylvania Univ.; practiced eight years, studied law, and on account of his anti-slavery sentiments removed to Iowa 1850, where he gained high rank as a lawyer; was an active republican, but declined various

public offices. He was appointed, 1862, by President Lincoln, associate-justice of the supreme court of the United States, and was for many years the senior justice in service. He delivered the oration, Philadelphia 1887, at the centennial celebration of the adoption of the national constitution.

MIL'LER, WARNER: b. Hannibal, Oswego county, N. Y., 1838, Aug. 12. He graduated from Union College 1860, taught in Fort Edward Collegiate Institute, enlisted as a private in the Union army 1861, was taken prisoner at the battle of Winchester, paroled, and in a short time honorably discharged. He visited Europe, and on his return engaged in the manufacture of paper in Herkimer, N. Y. He was a delegate to the republican national convention 1872, member of the state assembly 1874-78, and of the lower house of congress 1878-81. In the latter year he succeeded Thomas C. Platt, who had resigned, in the senate, and served till the expiration of the term, 1887. He was defeated 1888 as republican candidate for governor of N. Y., and was elected president of the Nicaragua Canal Construction Co. 1890, Mar. 6.

MIL'LER, WILLIAM: 1782, Feb. 5—1849, Dec. 20; b. Pittsfield, Mass.; founder of the religious sect known as 'Adventists,' formerly 'Millerites.' His education was limited, but he became a successful farmer and held the offices of justice of the peace, constable, and sheriff, and was captain of volunteers in the war of 1812. He accepted infidel doctrines, but soon renounced them, became a Baptist, and engaged in a close study of the Bible, with no aid except a concordance. After some years he announced that he had found a key to the prophecies, and, about 1833, he began to lecture on the second coming of Christ, which he asserted would occur within one year from 1843, Mar. 21. He obtained a license to preach, but was never ordained. Some 50,000 people accepted his doctrines. The failure of fulfilment of his prophecy was charged to an error in computation, and he continued to look for the speedy coming of the Lord. He called a convention 1845, Apr. 25, at which his followers took the name Adventists (q.v.). He died at Low Hampton, N. Y.

MILLERITE, n. *mĭl'ĕr-īt* [after Professor *Miller*, of Cambridge]: a mineral, sulphate of nickel, occurring in delicate six-sided prisms of a bronze yellow.

MIL'LERITES: peculiar millenarian sect. See MILLER, WILLIAM (1782-1849); also SEVENTH-DAY ADVENTISTS.

MIL'LER'S THUMB. See BULLHEAD.

MILLESIMAL, a. *mĭl-lĕs'ĭ-măl* [L. *millesĭmus*, the thousandth—from *millĕ*, a thousand]: consisting of thousandth parts. MILLES'IMALLY, ad. *-lī*.

MILLET, n. *mĭl'lĕt* [F. *millet* or *mil*—from L. *milĭum*: millet]: grain-bearing plant, consisting of a jointed stem having a large head containing abundance of small edible

grains; of species of *Panicum, Setaria,* and allied genera. The genus *Panicum* contains many species, natives of tropical and warm temperate countries, and some of which, as *Guinea Grass* (q.v.), are among the largest fodder grasses. The flowers are in spikes, racemes, or panicles; the glumes very unequal, one of them often very minute; each spikelet containing two florets, one of which is often barren. The genus *Setaria* has a spike-like panicle, with two or more bristles under the glumes of each spikelet.—COMMON MILLET (*Panicum miliaceum*) is an annual grass, three or four ft. high, remarkably covered with long hairs, which stand out at right angles. It has a much-branched nodding panicle; the spikelets are oval, and contain only one seed. It is a native of the E. Indies, but is extensively cultivated in the warmer parts of Europe and other quarters of the world. It succeeds only in those climates in which wine can be produced. It is called, in India, *Warree, Cheena,* and *Kadi-kane.* The grain, which is very nutritious, is only about one-eighth of an inch in length. It is used in the form of groats, or in flour mixed with wheat-flour, which makes a good kind of bread; but bread made of millet alone is brittle and full of cracks. Poultry are extremely fond of millet. The straw is used for feeding cattle.—Other species, *P. miliare, P. frumentaceum,* and *P. pilosum,* are cultivated in different parts of India, chiefly on light and rather dry soils, yielding very abundant crops.—GERMAN MILLET, or MOHAR (*Setaria Germanica*), and ITALIAN MILLET (*S. Italica*), regarded by many as varieties of one species, and probably originally from the East, though now naturalized in s. Europe, are cultivated in many warmer parts of Europe, in India, and other countries. Italian millet is three or four ft. in height: German millet is much dwarfer, and its spike comparatively short, compact, and erect; and less valuable as a grain-plant. The grains of both are very small, only about half as long as that of Common millet; but they are extremely prolific, one root producing many stalks, and one spike of Italian millet often yielding two ounces of grain. The produce is estimated as five times that of wheat. Italian millet is called, in India, *Koongoonie, Kalakangnee,* and *Korakang.* The grain of these millets is exported for feeding cage-birds, and for use as a light and pleasant food, though for this purpose it is little used in Britain and the United States, while it is extensively used in soups, etc., in s. Europe. It does not make good bread. To the same tribe of grasses belong the genera *Paspalum, Pennisetum, Penicillaria, Digitaria,* and *Milium*—species of which are cultivated in different parts of the world for their grain. *Paspalum exile* is the *Fundi* (q.v.) of Africa; and *P. scrobiculatum* is the *Koda* of India, where it is cultivated chiefly on poor soils. *Penicillaria spicata,* or *Pennisetum typhoideum,* is extensively cultivated in Africa and to a considerable extent in India. Its cultiva-

tion has been introduced into s. Europe. It thrives best on light soils. Its Indian name is *Bajree.* It often receives the names EGYPTIAN MILLET and GUINEA CORN (q.v.). It has a somewhat spiked cylindrical panicle.—*Pennisetum distichum* abounds in central Africa, on the s. borders of the Great Desert, where it is called *Uzak,* and is described by Barth as causing much inconvenience to the traveller, the little bristles which are attached to its seeds making them stick like burs to the clothes; they also pierce the skin and cause sores, so that it is necessary to be provided with small pincers for their extraction, and none even of the wild roving natives is ever without such an instrument. But its seed is a common and pleasant article of food, in some places the principal food of the people, and a pleasant beverage is made from it.—*Digitaria sanguinalis* is called POLISH MILLET, being cultivated in cottage-gardens in Poland, where the grain is used like rice. It is a common grass in many parts of Europe, though very rare in Britain. The spikes in this genus are compound, and from their appearance give it the names *Digitaria* and *Finger-grass.*—The MILLET GRASS (*Milium effusum*) of Britain, occasionally found in shady woods, is a very beautiful grass, 3 or 4 ft. high, with a spreading pale panicle of small flowers; and has been much recommended for cultivation as a forage grass, and for its very abundant small seeds, excellent food for game. Another species of the same genus (*M. nigricans*) is the *Maize de Guinea* of Peru, where its seeds, after being dried by heat, are converted into a very white flour, a pleasant article of food; and a beverage called *ullpu* is made from them.—The name INDIAN MILLET is sometimes given to *Durra* (q.v.), but it belongs to a different tribe of grasses from the true millets.

MILLET, *me-yā′,* AIMÉ: sculptor: b. Paris, 1816; d. there, 1891, Jan. 14. He studied painting under his father, and sculpture under David d'Angers. He began to exhibit 1842, and 1857 became famous by his *Ariadne,* which the French govt. bought for the museum of the Luxembourg. His statue of *Mercury,* exhibited 1859, and placed in the court of the Louvre; *Vercingetorix,* a colossal figure in bronze; *Apollo,* which crowns the grand opera-house in Paris; his work on the tomb of Henry Murger; his monument to Baudin in Père la Chaise, and statue for Léon Dupré's monument to the guards of the dept. of Eure who fell in the war of 1870-1, are his chief works. Great knowledge of the human figure, and skill in molding it, are shown in all his productions.

MILLET, *mīl′ĕt,* FRANCIS DAVIS: painter: b. Mattapoisett, Mass., 1846, Nov. 3. He graduated at Harvard 1869, studied art at Antwerp, gained honors there 1872-3, painted in Belgium, Italy, England, France, and Austria, and settled in New York. He served as art juror in the Vienna world's fair 1873; and during the Turko-Russian

war, 1877-8, was correspondent of the London *Daily News*. At the Paris exposition, 1878, he was a fine-arts juror. He gained a medal at New Orleans 1885, and a prize of $2,000 from the Amer. Art Assoc. 1886. His paintings include landscapes, figures, and portraits, and his literary work a translation of Tolstoi's *Sebastopol*, 1887.

MILLET, *mē-yā'*, JEAN FRANÇOIS: French painter: 1814, Oct. 4—1875, Jan. 20; b. Gréville (Manche). He studied under Mouchel and Langlois at Cherbourg, and Delaroche in Paris; began exhibiting 1844, and till 1848 executed pictures marked by rough vigor; but from 1849 his style changed, and he became a painter of pastoral pieces of great refinement in thought and execution. A peasant himself in origin, his representations of lowly and simple peasant life were wonderfully natural and touching; and in his limning of the fields, with scenes of labor or of animal life, he rose to the highest distinction as a landscape and figure painter. The pictures of his first style were *Milkmaid, Lesson in Riding, Œdipus,* and *Jews at Babylon.* In 1849, he began, in the style of his best work, with *The Sower,* and in the ten years following produced *Country Woman Seated, Men Binding Wheat, Shepherds, Harvesters, Clipping Sheep, Grafter* (which brought at a sale [1881] 133,000 francs), *Gleaners, Angelus, Death and the Woodcutter,* and *Woman with a Cow.* A score of other important works were brought out 1860-70, and after Millet's death 56 pictures and studies, many unfinished, remained in his studio, and were sold for 321,034 francs. The popularity of his pictures has caused them to be extensively engraved and widely dispersed; and a large number of the originals are owned in the United States. The *Angelus* was sold in Paris 1889, and brought $110,000. It was brought to America, and was exhibited to admiring crowds in New York, Chicago, and other places. Millet gained second-class medals 1853 and 64, and first-class 1867. He was elected to the Legion of Honor 1868. He died at Barbizon (Seine-et-Marne).

MILLI, prefix, *mĭl-lĭ* [L. *millĕ,* a thousand]: a thousandfold.

MILLIARD, n. *mĭl-yâr'* [F. *milliard*—from L. *millĕ,* a thousand]: a thousand millions.

MILLIGAN DECISION, THE: an important ruling of the United States Supreme Court in 1866. In 1864, an Indiana man named Milligan was arrested by a United States officer on charges of conspiracy, inciting insurrection, and giving aid to the enemy. He was tried by a military commission, found guilty, and sentenced to be hanged. His counsel filed in the circuit court a petition for a writ of habeas corpus, claiming that the plaintiff was a civilian in no way connected with the military service, and that he was not in a rebel state. The case

was carried to the supreme court, where it was held that a military commission organized during the war in a state not invaded or in rebellion, and where the federal courts were open and unobstructed, had no jurisdiction to try, convict or sentence for a criminal offense a citizen who was neither a resident of a state in rebellion nor a prisoner of war.

MILLIGRAMME, n. *mĭl'lĭ-grăm* [F.—from L. *millĕ*, a thousand: Gr. *gramma*, a letter of the alphabet, a figure]: in the *metric system*, the thousandth part of a Grain (q.v.).

MILLIKEN'S BEND, ENGAGEMENT AT: Milliken's Bend, La., on the west bank of the Mississippi, about 15 miles above Vicksburg, was the base of some of the military operations against that place and the lower Mississippi. Early in 1863, June, when Grant was besieging Vicksburg from the east, Gen. E. Kirby Smith, commanding the Confederate department of the Trans-Mississippi, sent Gen. J. G. Walker's division of 4,000 men to seize the place and other points on the river, and open communication with General Pemberton, in Vicksburg, with the object of furnishing him supplies, or, failing in that, to cover his escape across the river. Walker moved to Alexandria, La., and reported to Gen. R. Taylor, commanding in West Louisiana, and was sent in transports up the Washita and Tensas rivers, until abreast of Vicksburg, when he landed and marched across to Richmond. At this time Milliken's Bend was held by Gen. E. S. Dennis, with about 1,400 men, mostly colored troops. A reconnoitering party sent out by Dennis was driven back by the Confederates. Walker arrived at Richmond at 10 A.M. of the 6th, and was ordered by Taylor to send one brigade to Young's Point and one to Milliken's Bend, distant respectively 20 and 10 miles, and to hold a third brigade in reserve six miles in advance of Richmond. Harris' brigade moved at night on Young's Point, was delayed, and accomplished nothing. Gen. H. E. McCulloch, with a Texas brigade of 1,600 men and 200 cavalry, marched from Richmond at 6 P.M. of the 6th, and at 3 A.M. of the 7th, when, within one and a half miles of Milliken's Bend, the Union skirmishers were encountered and the Confederate advance driven back in some disorder; but McCulloch rallied his men and pushed on, driving the Union troops back slowly to their main line, carrying the Union breastworks and driving the Union troops back to the bank of the river, where two gunboats came to their assistance and, pouring shells into the ranks of the Confederates, obliged them to withdraw and return to Richmond. The Union loss was 127 killed, 287 wounded, and 266 missing; the Confederates lost 44 killed, 131 wounded, and 10 missing.

MILLIKIN, JAMES: American banker and philanthropist: b. Pennsylvania, 1830, Aug. 2. He went to Illinois

as a young man, and in 1860 engaged in banking, later founding the firm of Millikin & Company at Decatur, now the Millikin National Bank, of which he is the president. He is also president of the Union Works. Mr. Millikin has long been known for his philanthropic and benevolent enterprises; for his generous liberality to charities and churches, irrespective of denominations, and for his ready recognition of able and deserving young men, to many of whom he has given valuable assistance in accumulating wealth. He founded the Anna B. Millikin Home, an institution for the care of aged women and children, built and supported mostly by him, and named by the board of directors after his wife, Anna B. Millikin. He founded also the James Millikin University, dedicated in 1904 by President Roosevelt.

MILLILITRE, n. *mĭl'lĭ-lē'tr* [F.—from L. *millĕ,* a thousand; F. *litre,* a unit of measure]: the one-thousandth of a Litre (q.v.).

MILLIMETRE, n. *mĭl'lĭ-mā'tr* or *-mēt'r* [F.—from L. *millĕ,* a thousand; Gr. *metron,* a measure]: a French linear measure containing the thousandth part of a Mètre (q.v.).

MILLINER, n. *mĭl'ĭn-ėr* [supposed to be from *Milan,* a town in Italy—that is, a dealer in Milan wares]: one who makes and sells bonnets, head-dresses, etc., for females. MIL'LINERY, n. *-ėr-ĭ,* bonnets, caps, etc., worn by females; the materials composing them; the business. *Note.*—A *milliner* was formerly of the male sex, and was a dealer in such miscellaneous articles as were imported from Milan. From the fact that formerly a *milliner* was a haberdasher and seller of miscellaneous small-wares, its possible origin from L. *millĕ,* a thousand, is suggested. See SKEAT.

MILLION, n. *mĭl'yŭn* [F. *million;* Sp. *millon;* It. *milione,* a million—from L. *millĕ,* a thousand]: ten hundred thousand—in figures, extending to seven places, as 1,000,000; a very great number. MILLIONTH, a. *mĭl'yŭnth,* the ten-hundred-thousandth; constituting one of a million. MILLIONAIRE, n. *mĭl'yŭn-ăr'* [F. *millionnaire*]: a man worth a million of money; a very rich man. MIL'LIONARY, a. *-ėr-ĭ,* pertaining to or consisting of millions. MILLIONED, a. *mĭl'yŭnd,* multiplied by millions. THE MILLION, the great body of the people; the public, as distinguished from a select class.

MIL'LIS, JOHN: American military engineer: b. Wheatland, Mich., 1858, Dec. 31. He was graduated from West Point in 1881 and served in the engineering corps until 1883, after which he performed various engineering duties under the government, and in 1894-8 was chief-engineer of the United States Lighthouse Board at Washington. In 1898-1900, he was on duty with the engineers' battalion at Willet's Point, N. Y., and in Cuba. He was sent as delegate to various engineering conferences in

Paris in 1900, and visited Egypt on inspecting duty. From 1900-5 he was on duty at Puget Sound, engaged in river and harbor improvements and fortifications, and since 1905 has been in charge of fortification construction in the Philippine Islands.

MILLS, ALBERT LEOPOLD: American military officer: b. New York city, 1854, May 7. He was graduated from West Point in 1879 and was commissioned in the cavalry. He served in several campaigns against the Indians and in 1894-8 was instructor in the United States military school at Fort Leavenworth, Kan. Upon the opening of the war with Spain he was ordered to the front, where he rendered distinguished service at the battles of Las Guasimas and Santiago and was brevetted major and lieutenant-colonel. From 1898-1906 he was superintendent at West Point, with the rank of colonel and regimental captain; and, since 1907, Jan. 16, has been commander of the department of the Visayas.

MILLS, BENJAMIN FAY, A.M., D.D.: American Unitarian clergyman: b. Rahway, N. J., 1857, June 4. He was graduated from Lake Forest University (Ill.) in 1879, was ordained to the Congregational ministry in 1878, held a pastorate at Rutland, Vt., was a prominent evangelist in 1886-97. In 1897, he withdrew from the Congregational denomination owing to his liberal views, and in 1897-9 conducted independent religious meetings in Boston. From 1899-1903 he was pastor of the First Unitarian Church at Oakland, Cal., and in 1904 founded a new religious organization, the Los Angeles Fellowship. Among his books are: *Power from on High* (1889); *Victory through Surrender* (1892); *God's World* (1893); *Twentieth Century Religion* (1899); *The Divine Adventure* (1905); etc.

MILLS, CLARK: American sculptor: b. Onondaga county, 1815, Dec. 1; d. Washington, D. C., 1883, Jan. 12. He went South, learned the millwright's trade, worked at New Orleans, and later at Charleston, where he was employed by a plasterer, and discovered a method for taking a cast from the living face which enabled him to make plaster busts cheaply. In 1845, he completed a bust in marble of Calhoun, which was placed in the Charleston city hall in 1846. In 1848, he was appointed by the government to execute an equestrian statue of Andrew Jackson. This was the first large statue cast in metal in the United States. Mills was obliged to learn casting, since there was then no foundry in the country adequate to the work, and when the statue was at last completed it was at a loss to himself of $7,000. This was later repaid to him by congress in an appropriation of $20,000 for a replica at New Orleans. His colossal equestrian statue of Washington, depicting the general at the battle of Princeton, was unveiled at Washington 1860, Feb. 22. He also cast from designs by Thomas Crawford

the statue of *Freedom*, which was placed surmounting the dome of the capitol in 1863, and took a life-mask of President Lincoln shortly before the latter's death.

MILLS, DARIUS OGDEN: American banker and capitalist: b. North Salem, Westchester county, N. Y., 1825, Sep. 25. He was educated in the North Salem Academy and the Mount Pleasant Academy, Sing Sing, N. Y., later becoming cashier of the Merchants Bank of Erie County, Buffalo, N. Y. In 1849, he went to California, where he founded the banking house of D. O. Mills & Co.; from 1864-7 was president of the Bank of California, San Francisco, and after the failure of the institution again taking charge of it until 1878. Since 1880 he has been largely interested in New York real estate; is also prominent in philanthropic enterprises, the Mills hotels being the most noted examples of his generosity.

MILLS, DAVID: Canadian jurist: b. Oxford, Ontario, 1831, Mar. 18. He was educated at the University of Michigan and entered early upon a public life. He served in the Dominion house of commons 1867-96 and was editor of the *Canada Daily Advertiser*, London, Ont., 1882-7. In 1876-8, he was minister of the interior and was minister of justice 1897-1901, since when he has been justice of the supreme court of Canada. He has contributed to the magazines many articles on public questions and has published *The English in Africa* (1900).

MILLS, JOB SMITH: American United Brethren bishop: b. near Portsmouth, Ohio, 1848, Feb. 28. He was graduated from the Illinois Wesleyan University and studied for the ministry. In 1874-80, 1885-7, he was pastor of Otterbein University, Watertown, Ohio, and in 1887-93 was professor in various branches and then president of Western College, Toledo. He was made bishop in 1893 and has since visited the principal universities of Europe. He has written: *Mission Work in West Africa* (1898); *Holiness* (1902); etc.

MILLS, LAWRENCE HEYWORTH: American philologist: b. New York, 1837. He was graduated at New York University in 1857, and at Fairfax Episcopal Theological Seminary, Va.; and entered the Episcopal ministry in 1861. He was stationed in Brooklyn for six years; retired from the ministry in 1867; studied Gnosticism and the Avesta in Europe 1872-87; and in the last named year, having established his reputation as an authority on the Zend-Avesta, went on Max Müller's invitation to Oxford, where he became professor of Zend philology in 1898. He contributed largely to Oriental journals various papers on the Gâthâs and early Zoroastrianism; translated *Zend-Avesta* (Part III. in *Sacred Books of the East*, 1887); and wrote: *Study of the Five Zarathustrian Gâthâs* (1894); *Gâthâs of Zarathustra in Metre and Rhythm* (1900); *Dictionary of the Gathic Language of*

the Zend-Avesta (1902); and *Zoroaster, Philo, and Israel* (1903).

MILLS, Robert: American architect and engineer: b. Charleston, S. C., 1781; d. Washington, D. C., 1855, Mar. He was a pupil of the architect Benjamin Latrobe, and besides designing important structures in Philadelphia, including the single-arch bridge across the Schuylkill, erected custom-houses and marine hospitals in various parts of the United States and the Washington Monument in Baltimore. In 1837, he was appointed architect of the general government at Washington, where he built the Treasury, General Post-Office, and Patent Office, and designed the Washington Monument. He published: *Statistics of South Carolina* (1826); *American Pharos, or Lighthouse Guide* (1832); etc.

MILLS, Roger Quarles: American lawyer and politician: b. Todd county, Ky., 1832, Mar. 30. He moved to Texas in 1849, and studied law; was admitted to the bar at 20, the Texan legislature removing the disability of minority; and began practice at Corsicana. In 1859, he was elected to the Texas legislature. On the outbreak of the civil war he joined the Confederate service, and fought throughout the war. In 1872, he was elected to congress as a democrat, serving till 1892; he was chairman of the house committee on ways and means, and drafted the Mills tariff bill, which, however, failed to become a law. In 1892, he was elected to the senate to fill an unexpired term, and in 1893 was re-elected for the full term of six years.

MILLS, Samuel John: American Congregational clergyman: b. Torringford, Conn., 1783, Apr. 21; d. at sea, 1818, June 16. He was graduated from Williams College in 1809, where he had as an undergraduate organized the first society of foreign missionaries in America, and he afterward studied at Yale and at Andover Seminary. In 1810, he founded the American Board of Commissioners for Foreign Missions. He was licensed to preach in 1812 and at once went on a missionary tour through the southern states, and made a second tour in 1814, succeeding in organizing various religious societies. He was ordained to the ministry in 1815 and in 1817 was sent to Africa to select a site for a colony. He died on the way home.

MILLS, Walter Thomas, a.b., a.m.: American Socialist lecturer: b. Duane, N. Y., 1856, May 11. He was graduated from Wooster University in 1885. He was one of the editors of the *New Voice* (1885-7); and editor of the *Statesman Magazine*, Chicago (1887-90). He was the first delegate sent by the American Federation of Labor to the British Trades Congress in 1892; and was general chairman on Labor Congresses for the World's Fair at Chicago. In 1893-1900, he was engaged in trying to establish a self-supporting farm scheme; in 1900, he

allied himself with the Socialist party, and established the International School of Social Economy, of which he has been principal. This school has 4,000 correspondence students, and held four sessions of special training school courses. He has written *Science of Politics* (1887); *Social Economy* (1903); *The Struggle for Existence* (1904); etc.

MILLS BILL. See TARIFF.

MILLS COLLEGE: at Mills College (P. O.) in Alameda county, Cal., was founded in 1871 as Mills Seminary for Young Women. It was chartered as a college in 1885. It has preparatory and business departments and a college department, the courses of which lead to the degrees of A.B. and B.L. In 1907, there were connected with the college 35 instructors and 208 students. The property was valued at $410,000, and the endowment was $150,000.

MILLS HOTELS: the philanthropic enterprise of D. O. Mills (q.v.) inaugurated in 1897. These are two hotels situated in the tenement districts of New York city and built and operated for the purpose of housing and feeding the unemployed or small-salaried man. The Bleecker Street Hotel has 1,554 rooms, and the Rivington Street Hotel 600, about 100 of which rent for 30 cents per night and the balance for 20 cents. These bedrooms are all separate, about 7½x6 feet in size, and containing a single iron bedstead, one chair and a closet. There are large reading, writing and smoking rooms, a well stocked library, free shower baths, custom laundry, news-stand, etc., conducted as in other first-class hotels. The restaurant is conducted so as to give good food, nutritious, well cooked, and at a price remarkable for cheapness. The average cost of living in the hotels has been from $3.50 to $4 per week, making them a haven for respectable poor men.

MILLSPAUGH, *mĭlz'pâ*, CHARLES FREDERIC: American botanist: b. Ithaca, N. Y., 1854, June 20. He studied a year at Cornell; was graduated at the New York Homœopathic Medical College in 1881; practised medicine for 10 years; and became botanist of West Virginia University in 1891, professor of medical botany in the Chicago Homœopathic Medical College in 1897, having been curator of the department of botany in the Field Columbian Museum since 1894. He traveled in Mexico, in Brazil, and in the West Indies, and is the author of *American Medical Plants* (1887); *Flora of St. Croix, D. W. I.* (1902); *Plantæ Yucatanæ* (1903); etc.

MILLSPAUGH, FRANK ROSEBROOK, D.D.: American Protestant Episcopal bishop: b. Nichols, N. Y. He was graduated from the Shattuck School, Faribault, Minn., in 1870, and from the Seabury Divinity School there in 1873. He entered the Episcopal ministry in the year last named, served as missionary in Minnesota 1873-6, was subsequently dean of the Omaha (Neb.) Cathedral, rector

of St. Paul's, Minneapolis, and dean of Topeka (Kan.) Cathedral. In 1895, he was consecrated bishop of Kansas.

MILL SPRINGS: Ky., village in Wayne county; on the Cumberland river; about 90 miles south of Frankfort. It has steamer connections with places on the Cumberland and Ohio rivers. A battle was fought here 1862, Jan. 19, between a Federal force of 4,000 men, under Gen. George H. Thomas, and a Confederate force, about the same number, under Gen. George B. Crittenden. The Federals were successful. The names 'Battle of Fishing Creek,' 'Battle of Logan's Cross Roads,' and 'Battle of Mill Springs' are given to this engagement. A national cemetery located here contains 718 graves of soldiers; 366 are of unknown dead.

MILL SPRINGS, BATTLE OF: the opening of the Kentucky-Tennessee campaign of 1862. At the close of 1861 the Confederate line extended from Columbus, Ky., on the Mississippi, through Fort Henry on the Tennessee, Fort Donelson on the Cumberland, Clarksville, Tenn., and Bowling Green, Ky., to Mill Springs on the Cumberland. Gen. A. S. Johnston was in chief command. Gen. D. C. Buell was the opposing Union commander. Gen. F. K. Zollicoffer established the Confederate right at Mill Springs early in December. Gen. Geo. B. Crittenden took general command there at the middle of the month, with the brigades of Zollicoffer and W. H. Carroll under him. Gen. Leonidas Polk held the Confederate left at Columbus, Gen. J. B. Floyd reached Fort Donelson February 13 and had under him Gens. Pillow, Buckner, and Bushrod Johnson. Gen. A. S. Johnston was at Bowling Green, the centre. Gen. Geo. H. Thomas was on the Union left, with Gen. Schoepf immediately opposed to Zollicoffer, while Gen. Buell, with headquarters at Louisville, was in close communication with the Union centre, which threatened Bowling Green and Nashville.

Gen. Zollicoffer having crossed from Mill Springs to the north bank of the Cumberland and intrenched his position, from which he threatened central Kentucky, Gen. Thomas was sent against his forces, now commanded by Gen. Crittenden, from the direction of Lebanon. On January 18, Gen. Thomas reached Logan's Cross Roads about 10 miles from Crittenden's intrenchments. The latter officer, with the purpose of attacking before Thomas could concentrate his forces, marched at midnight of the 18th with Zollicoffer's and Carroll's brigades, consisting of eight regiments of infantry, six guns, and four battalions of cavalry, and attacked Gen. Thomas soon after daylight of January 19.

The Union troops, consisting of six infantry regiments, one battery, and a portion of a cavalry regiment, were brought rapidly into action, both sides fighting with spirit. Finally, when three fresh Union regiments fell on the Confederate right, and the 2d Minnesota was

pouring a galling fire upon the centre, the 9th Ohio (German Turners) made a brilliant bayonet charge completely turning the Confederate left, resulting in the Confederate lines breaking and retiring in confusion. At this point Gen. Schoepf's brigade from Somerset reached the field, and the whole force continued in pursuit, reaching the Confederate intrenchments during the night, and forming to assault them at daylight. During the night the Confederates succeeded in crossing their men, leaving artillery, cavalry, horses, mules, wagons, camp equipage and private baggage. The Confederate right wing was effectually broken and largely dispersed.

The overthrow of the Confederate right was followed February 6 by the capture by Admiral Foote, acting in co-operation with Gen. Grant, of Fort Henry on the Tennessee, and February 16 by the capture of Fort Donelson, with its artillery and garrison of about 15,000, by Gen. Grant.

On February 8, Gen. Johnston notified the secretary of war that the loss of Fort Henry and the movement against Fort Donelson made the Bowling Green line untenable, and that he had directed Gen. Hardee at Bowling Green to prepare to fall back on Nashville. The evacuation was completed February 14, and by the 17th Gen. Hardee had crossed the Cumberland at Nashville and proceeded toward Murfreesboro. Ten days later, all army supplies having been sent to Chattanooga, which place was held by troops sent by Gen. Bragg from Mobile, Johnston's army marched for the line of the Memphis & Charleston railroad at Decatur, this line having been decided upon as the next for defense.

By the last of March, Johnston's column had taken position at Corinth, Bragg's forces had reached him from Mobile, and a portion of Polk's from Columbus.

Meantime (February 15) Bowling Green was occupied by Union forces under O. M. Mitchel. Pressing on, he reached Edgefield opposite Nashville on the 14th. Nelson's division arrived by transports the next day, and soon after the first of March Buell's entire column, coming partly by land and in part by river, was concentrated at Nashville.

The Union movement to Pittsburg Landing began March 10 by the despatch of Gen. W. T. Sherman's division from Paducah up the Tennessee. It proceeded, under orders of Gen. C. F. Smith, to the vicinity of Eastport; but finding all streams inland at flood the expedition dropped back to Pittsburg Landing, where it found Hurlbut's division. The latter took post 1½ miles back February 18, and Sherman's the next day about three miles back, at Shiloh Church. These were followed within a few days by the divisions of Prentiss, McClernand and W. H. H. Wallace, each selecting its own camp without special reference to a general line, the movement being regarded as a concentration preparatory to an advance on Corinth.

Gen. Lew Wallace's division was halted at Crump's Landing, five miles below Pittsburg. Gen. Grant arrived and assumed command March 17, establishing his headquarters at Savannah nine miles below, on the opposite side of the Tennessee.

Gen. Buell's advance left Nashville March 15 to join Gen. Grant at Savannah. After marching 130 miles in nine days he was stopped by high water in Duck river, necessitating bridging, and then marched the remaining 90 miles in six days. Gen. Grant had advised him that it was not necessary to hurry, as he would not be ready to cross his command over the river till April 8. However, Buell pushed on and fortunately reached Savannah with the head of his column the night of the 5th. Gen. Johnston, with the design of attacking Grant before Buell could join him, had marched from Corinth April 3d, with the expectation of attacking on the 5th, but heavy rains delayed his columns, and his unexpected attack was delivered soon after daylight of April 6, thus opening the battle of Shiloh or Pittsburg Landing. See SHILOH, BATTLE OF.

MILL'STONE: one of the two cylindrical stones used to grind grain into flour (q.v.). The best foreign stones are the German basaltic lava quarried near Cologne, and the French burstone; both are imported into the United States in small pieces from which the cylindrical stone is built up. The native stone is commonly used in the single piece; a sandstone found in Ulster county, N. Y., and in Lancaster county, Pa., and a burstone much like the French, are the best materials, being hard and tough and having a cellular structure, which in the burstone is due to the presence of fossil casts. The lower stone is usually fixed; the upper stone is the 'runner.' Each stone is deeply scored with furrows, which lead the milled grist away from the centre; the intervals are styled 'land'; and the hole in the centre is called the 'eye.' A depression about the eye is the 'bosom.' The scheme for scoring the stone varies greatly. The roller process has relegated the millstone to the minor grist mills.

MILL'VALE: Pa., borough, in Allegheny county; on the Allegheny river, and on the Pittsburg & W., the Buffalo, R. & P., and the Pennsylvania railroads; opposite Pittsburg. It is really an industrial suburb of Pittsburg; its chief manufactures are lumber, iron products, saws, dressed stone, and steel products. The government is administered by a burgess, who holds office three years, and a council. The borough owns and operates the electric light plant and the water works. Pop. (1900) 6,736.

MILLVILLE, *mĭl'vĭl:* city, Cumberland county, N. J., on the e. bank of the Maurice river, at the head of navigation. It is on the Pennsylvania railroad, 41 m. s. and e. of Philadelphia, six m. s. of Vineland. It has several churches, good schools, two newspapers, a national bank, and several hotels. Its extensive manufactures include

cotton, lumber, hollow glassware and window-glass, iron pipes for water and gas, and turbine water-wheels. It has a large trade with the agricultural communities by which it is surrounded, and many of its manufactures are sent to distant points. Pop. (1900) 10,583.

MILMAN, *mil'man*, HENRY HART, D.D.: English poet and ecclesiastical historian: 1791, Feb. 10—1868, Sep. 24; b. London; youngest son of Sir Francis Milman, physician to George III. He was educated at Eton, and afterward at Brasenose College, Oxford, where he took the degree M.A., and obtained the Newdegate prize 1812. He published *Fazio: A Tragedy* (successfully brought upon the stage at Covent Garden) 1815; took priest's orders 1817; and soon was appointed vicar of St. Mary's, Reading. In the following year appeared his *Samor, Lord of the Bright City: An Heroic Poem*, followed 1820 by the *Fall of Jerusalem*, a beautiful dramatic poem, with some fine sacred lyrics interspersed. In 1821 Milman was chosen professor of poetry at Oxford, and published three other poems in the same year—*The Martyr of Antioch, Belshazzar*, and *Anne Boleyn*. His *Sermons at the Bampton Lecture* appeared 1827, and *History of the Jews* (3 vols.) 1829. The last of these works did not bear the author's name; it was so broadly liberal that ecclesiastics of the stricter sort could hardly fail to be offended. Its weak point was a want of adequate learning, especially in biblical criticism. A new ed., greatly improved, and more critical, yet still far from accurate or solid, with an interesting preface, was published 1863. In 1840 appeared a collected ed. of his *Poetical Works;* also, *History of Christianity from the Birth of Christ to the Abolition of Paganism in the Roman Empire* (3 vols.). In 1849 he was made dean of St. Paul's; and 1854 published his masterpiece, *History of Latin Christianity, including that of the Popes to the Pontificate of Nicholas V.* (3 vols.). It is a work of great learning, liberality, and chastened eloquence; it shows a broad grasp of human nature in its religious workings, besides a philosophic and poetical sympathy with the different men and opinions which it reviews. Milman edited Gibbon and Horace, and contributed extensively to the *Quarterly Review*. His delightful *Annals of St. Paul's Cathedral* were published 1868, and a complete ed. of his *Historical Works* (15 vols.) 1867-8.

MILMORE, *mil'mōr*, MARTIN: 1844, Sep. 14—1883, July 21; b. Sligo, Ireland: sculptor. He came to Boston 1851, learned wood-carving from a brother, and graduated 1860 from the Latin School. For some years he was pupil of Thomas Ball. He then opened a studio in Boston, but soon went to Rome to complete his art studies. He produced busts of Sumner, Longfellow, Emerson, and other eminent men. In 1863 he was commissioned to execute a soldiers' and sailors' monument to be placed on Boston Common. The soldiers' monument in

Forest Hill Cemetery, Roxbury, is from his design, as are also similar monuments in various cities. Among his noted works are the granite figures of *Ceres, Flora,* and *Pomona,* in Horticultural Hall, Boston; the *Weeping Lion* at Waterville, Me.; and the statue of *America* at Fitchburg, Mass. A bust of Webster for the state-house at Concord, N. H., was his last work. He died at Boston Highlands.

MILN, LOUISE JORDAN: English journalist and author; b. 1864, March 5. After extensive travel she contributed to various London journals, such as the *Pall Mall Gazette,* the *Morning Post,* the *Times,* and particularly the *British Realm.* Among her publications are: *When We Were Strolling Players in the East* (1894); *Quaint Korea* (1895); *An Actor's Wooing* (1896); *Little Folk of Many Lands* (1899); etc.

MILNE, JOHN: English geologist: b. Liverpool, 1850. After study at the Royal School of Mines, London, he traveled in Iceland, mined in Newfoundland (1873-4), and in 1875 became professor of mining and geology under the Japanese government. He is a recognized authority on seismology, published a volume on *Earthquakes* (*Natural Science* series), and established the Japanese Seismological Society (1886).

MILNE-EDWARDS, *mĭln-ĕd'wardz,* F. *mēl-nā-dwâr',* HENRI, M.D.: one of the foremost of recent naturalists: 1800, Oct. 23—1885, July 29; b. Bruges, Belgium. His father was an Englishman. Milne-Edwards studied medicine at Paris, where he took his degree M.D. 1823, but applied himself to nat. history. In 1841 he was appointed prof. of nat. history at the Collége Royal, and afterward to the Faculté des Sciences, of which he became dean, and at the Jardin des Plantes. He was a member of the Académie de Médecine, and of most of the learned academies of Europe and America; and held several orders; among others, since 1861, that of commander of the Legion of Honor. He was among the first zoölogists to make repeated and prolonged visits to the sea-coasts for study of the higher and lower forms alive. He published numerous original memoirs of importance in the *Annales des Sciences Naturelles,* a journal which he assisted in editing for 50 years. His *Eléments de Zoölogie* were issued 1834, and reissued 1851 as *Cours Elémentaire de Zoölogie.* The latter had enormous circulation in his own and other countries, was translated into various languages, and till lately formed the basis of most minor manuals of zoölogy in Europe. His *Histoire Naturelle des Crustacés* (1834-40) was long the standard authority on the crustacea; the *Histoire Naturelle des Coraillaires* (1857-60) was almost equally noteworthy. *Lectures on the Physiology and Comparative Anatomy of Man and the Animals* (14 vols. 1857-81) are of great permanent value for the immense mass of details and copious references to scattered sources of information. He had an

important share in a splendid quarto of *Anatomical and Zoölogical Researches on the Coasts of Sicily.* Other works were researches on the nat. history of the French coasts (1832–45) and on the nat. history of the mammalia (1871). In some later works he was assisted by his distinguished son, Alphonse. M.-E. must always hold high rank among the naturalists of the 19th c. His services were valuable especially in the department of the invertebrates. His researches in the distribution of the lower invertebrates led him to the theory of centres of creation; and to this he adhered throughout life, notwithstanding the general acceptance of the newer views of Darwin by scientists.

MILNER, *mĭl′nĕr*, JOHN, D.D., F.S.A.: 1752, Oct. 14—1826, April 19; b. London: Rom. Cath. controversial writer. He received his education at Edgbaston and Douai, entered the priesthood 1777, two years later had charge of a chapel at Winchester, and 1803 was appointed bp. of Castabala and vicar-apostolic of the Midland district. His *History, Civil and Ecclesiastical, and Survey of the Antiquities of Winchester*, opened a controversy which was long continued, during which he published *Letters to a Prebendary* and *the End of Religious Controversy*, which hold a place as standard works in defense of the Rom. Cath. faith. While holding the office of bishop he took part in political affairs and strongly opposed giving the British government a veto power on the appointment of bishops of the Rom. Cath. Church. He was expelled, 1823, from the bishopric by the English Catholic board, and three years later died at Wolverhampton.

MIL′NER, JOSEPH: ecclesiastical historian: 1744–1797, Nov. 15; b. near Leeds, England. He studied at Cambridge, and afterward became famous as head-master of the grammar school at Hull. He was also lecturer in the principal church of the town, and, 1797, vicar of Holy Trinity Church. M.'s principal work is *History of the Church of Christ*, 4 vols. (3 vols. 1794). His brother, DR. ISAAC M., dean of Carlisle, published a complete ed. of his works, 8 vols., 1810. The principles on which the *History of the Church of Christ* is written are of the narrowest kind; the scholarship, literary style, and critical insight are alike poor.

MILNES, RICHARD MONCKTON: see HOUGHTON, Lord.

MI′LO: Greek island in the Cyclades group: see MELOS.

MILO, *mī′lō*, of Crotona, in Magna Græcia (q.v.): athlete famous throughout the ancient world for his great strength: lived, according to Herodotus, about the end of B.C. 6th c. Among other displays of strength, he is said to have carried a live ox upon his shoulders through the stadium of Olympia, and afterward to have eaten the whole of it in one day; and on another (reversing the story of the Hebrew Samson), to have upheld the pillars of a house in which Pythagoras and his scholars were assembled, so as to give them time to make their escape

when the house was falling. He is said to have lost his life through too great confidence in his own strength, when he was growing old, in attempting to rend asunder a tree, which some wood-choppers had left partially split, with a wedge: the wedge dropped out, and the tree closed upon his hands, holding him fast until he was devoured by wolves. This tradition has been used to point a moral.

MILREI, n., or MILREA, n., or MILREE, n. *mĭl′rē* [Port. *mil reis*, one thousand reis]: a Portuguese silver coin and money of account, value 4*s.* 8½*d.* to 4*s.* 10*d.* (abt. $1.14½ to $1.17½); used also in Brazil, where value, however, is from 2*s.* to 2*s.* 3*d.* only (abt. 48⅔ cents to 54⅔ cents). The coin is commonly known in Portugal as the *coroa*, or 'crown,' and is (since 1835, Apr. 24) the unit of the money-system in that country. The half-coroa, or half-milrei, of 500 reis, also is used in both Portugal and Brazil. The name 'milrei' was used in Portuguese accounts long before any coin representing its value existed.

MILT, n. *mĭlt* [Icel. *milti;* Dan. *milt;* It. *milza*, the spleen: Pol. *mleko*, milk; *melcz*, milt of fish: connected with Eng. *milk*]: the soft whitish substance found in male fish, as the roe is found in female fish; the spleen: V. to impregnate eggs or spawn, as a fish. MILT′ING, imp. MILT′ED, pp. MILT′ER, n. *-ĕr*, a male fish.

MILTIADES, *mĭl-tī′a-dēz:* celebrated Athenian general: B.C. 5th c.: 'tyrant of the Chersonese,' yet, as Byron sings, 'freedom's best and bravest friend.' Forced by Darius to flee from his dominions, he took refuge at Athens, and on the second Persian invasion of Greece, his military talents being of a high order, he was chosen one of the ten generals. He distinguished himself particularly by the great victory which he gained at Marathon (q.v.), with a small body of Athenians and 1,000 Platæans (B.C. 490, Sep. 29), over the Persian host, under Datis and Artaphernes. By this victory, the Greeks were emboldened for the heroic struggle which they made in defense of their country and their liberty. M., being intrusted with the command of an armament for the purpose of retaliating on the Persians, made an attack on the island of Paros, to gratify a private enmity; but failing in the attempt, he was, on his return to Athens, condemned to pay a heavy fine as indemnification for the expenses of the expedition. Being unable to do this, he was thrown into prison, where he died of a wound received at Paros. The fine was exacted after his death, from his son, Cimon (q.v.).

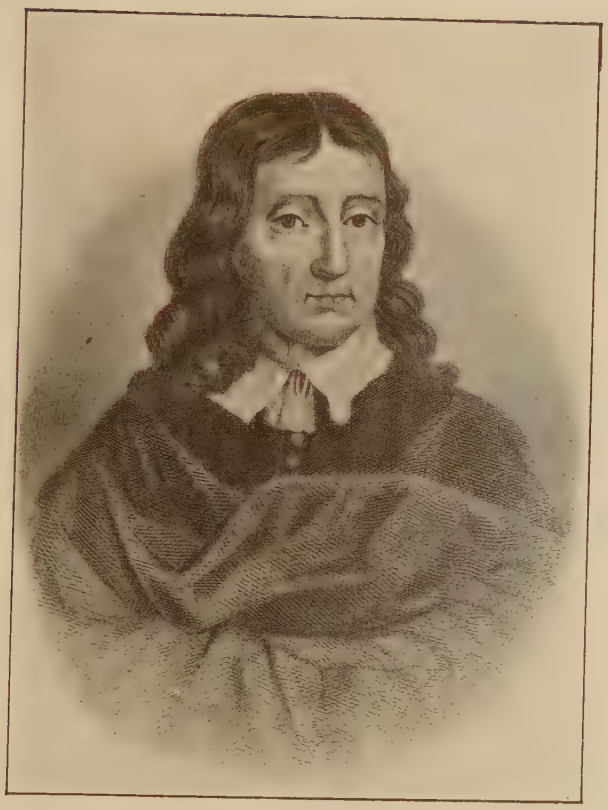
MILTON, *mĭl′ton:* town, Norfolk co., Mass., on the Neponset river, 9 m. s. of Boston, with which it has both steam and street railroad connections. It has extensive market-gardens, and manufactories of rubber goods, leather, paper, and chocolate. Quarries of a very fine granite are worked in summer. There are many beautiful drives, and the roads are excellent. Within the limits of M. are the Blue Hills, from which the state of Mass. received its Indian name. Pop. (1900) 6,578.

MIL'TON, JOHN: English poet: 1608, Dec. 9—1674, Nov. 8; b. in Bread Street, Cheapside, London; of an ancient Rom. Cath. family, though his father, becoming a Protestant, had been disinherited. Milton's father followed the occupation of a scrivener, by which legal business, according to Aubrey, 'he got a plentiful estate,' and was a man of great musical accomplishment, being composer, among other things, of the two well-known psalm-tunes *Norwich* and *York*. From him his son derived his matchless ear for melody, and that strict integrity of character for which he is as famous as for his verse.

Milton was carefully nurtured and educated. He was placed first under the care of a private tutor named Young, a Scotchman by birth and education; and at the age of 12 was sent to St. Paul's School, London, and afterward to Christ's College, Cambridge. According to the University Register, he was admitted 1624-5, Feb. 12. At first he was unpopular in the university, and was nicknamed 'the Lady of Christ's College,' partly from the gracefulness of his person, and partly from his fastidious severity of morals—a sort of haughty Puritanism. Before his graduation, however, he won general deference and regard, and a very high repute for scholarship and genius. He took his degree M.A.; and having relinquished the idea of following divinity because he could not bring himself to subscribe to Laud's high prelacy then in vogue, he left Cambridge 1632, and went to live at his father's house at Horton, in Buckinghamshire. There, in serenity of mind, he lived five years, reading the Greek and Latin poets, and composing *Comus, Lycidas, Arcades, L'Allegro,* and *Il Penseroso.* On the death of his mother, 1637, he went abroad, visiting the chief Italian cities, and making the acquaintance of Grotius and Galileo. While travelling, being made aware that clouds were gathering in the political atmosphere at home, he returned in 1639, and occupied himself with the tuition of his nephews—on which portion of Milton's life, Dr. Johnson could not avoid looking with 'some degree of merriment.' In 1641, he engaged in the controversies of the times, and in the course of that and the following year, he issued the treatises *Of Reformation,* the most powerful polemic pamphlet of the time against the prelatical episcopacy which had been retained when the English church had been reformed; *The Reason of Church Government urged against Prelacy; Prelatical Episcopacy;* and *An Apology for Smectymnuus.* In 1643, he married rather suddenly Mary, daughter of Richard Powell, an Oxfordshire royalist, but the union did not at first prove happy. His wife, only 17 years of age, who had been accustomed to 'dance with the king's officers at home,' found her husband's society too austere and philosophic for her gay tastes. After the severe honeymoon was over, she obtained permission to visit her relatives till Michaelmas; but when Michaelmas came, she

refused to return, and from her royalist family came the intimation that he need never expect her return. Stern and proud, Milton repudiated her at once; and the matrimonial disagreement made the world the richer by four *Treatises on Divorce.* A reconciliation, however, took place, which, we have no reason to doubt, was both genuine and permanent. Mary Powell died 1652-3, leaving her husband three daughters, Ann, Mary, and Deborah, of whose undutifulness and ingratitude we have latterly many complaints. In 1644 he produced his *Tractate on Education;* and, as a sort of remonstrance to the Long Parliament against their restriction of the liberty of printing, his famous *Areopagitica*—a flame of eloquence which still gives heat. The pressure of events had led Cromwell to fear the intolerance of the majority of the Long Parliament, who were bent on establishing the Church of England as Presbyterian and suppressing the various kinds of Independents or Congregationalists as sectaries and schismatics. Cromwell, as a believer in congregational independency, did not oppose a Presbyterian establishment, but insisted that such establishment should not be without guaranties of liberty of conscience and universal toleration, at least to all Protestants. The army, now victorious under Cromwell, was full of independent sectaries who echoed this demand for liberty. Milton's whole nature was in sympathy with it, and he plunged eagerly into the contest in its behalf. His theology, though deeply evangelical, was far from strictly Calvinistic, and he was in advance of his times in his cordial trust in the safety of liberty whether in church or state. In his tolerant views of church-order, he agreed with Cromwell, whom he greatly revered, calling him, 'Our Chief of Men.' After the execution of King Charles, he was appointed Latin secretary to the council of state, with a salary of £290, equal now to about $5,000. In his new position, his pen was as terrible as Cromwell's sword. In *Eikonoklastes,* he made a savage but effective reply to the famous *Eikon Basilike;* and in his *Pro Populo Anglicano Defensio* he assailed his opponent, Claude de Saumaire, better known as *Salmasius,* and reputed the greatest scholar in Europe, with such a storm of eloquence and abuse as to hasten the death of the latter, who died at Spa 1653. His second wife, whom he married 1656, Nov. 12, died 1658, Feb.

Unceasing study had affected his eyesight, and about 1654, Milton became totally blind. After the Restoration, he retired from affairs; he was obnoxious to the reigning power, and it is said that he was once in custody of the sergeant-at-arms. On the publication of the Act of Oblivion, he married his third wife, Elizabeth Minshull, and shortly afterward removed to a house in Artillery Walk, where he was busy with *Paradise Lost.* This great poem was planned originally as a mystery; then some idea of treating it as a drama haunted the author's mind; finally,



MILTON.

however, he resolved to write an epic poem on the Fall of Man. The poem was published 1667. He received five pounds from his publisher, and a promise of other five pounds when 1,300 copies should have been sold. In 1670, he published his *History of England.* Next year, he printed *Paradise Regained* and *Samson Agonistes.* He died, leaving property to the value of £1,500, and was buried next his father, in the chancel of St. Giles, Cripplegate.

M. was, above all English poets, stately and grand. He arrived early at the knowledge of his powers, and did not scruple, in one of his prose tracts, to inform his readers that he purposed to write a poem which would be considered one of the glories of his country. Drawn away for a time by the heats of controversy and by official tasks, he never forgot his pledge, and redeemed it at last in old age, blindness, and neglect. In comparison, other poets are like sailing-ships, at the mercy of the winds of passion and circumstance; he resembled the ocean steamer, which, by dint of internal energy, can pierce through the hurricane. Never, perhaps, was a mind more richly furnished. His careless 'largess' is greater than the fortunes of other men. His *Comus* is the very morning-light of poetry; while in his great epic, *Paradise Lost,* there is a massiveness of thought, a sublimity of imagery, a pomp of sound—as of rolling organs and the outbursting of cathedral choirs—which can be found nowhere else. His great passages echo in the mind as if loath to die. Of all great writers he is perhaps the one for whom we are conscious of the least personal affection, and this arises from a certain hauteur and severity which awes—which repels some natures; yet he infects his reader with his own seriousness. See Pattison's short life (1879); Stern's *M. u. seine Zeit* (1878); and Masson's *Life and Times of M.,* 6 vols. (1858-80).

MILTON, borough in Northumberland co., Pa., on the Susquehanna river and the Pennsylvania canal, and on the Philadelphia & Reading and Philadelphia & Erie division of the Pennsylvania R.R.'s; about 66 miles north of Harrisburg. It was settled in 1768 by Marcus Hulings, and laid out in 1792 by Andrew Straub. It was incorporated as a borough in 1816. Milton is a manufacturing place; the chief industrial establishments are car works, which have 525 employees; iron mills, with 950 employees; machine shops, 175; knitting and spinning mills, 320; bamboo furniture factories, 80; nail mill, 100; and other manufactories employing about 450 persons. The industries are all of home development; the report of the factory inspector shows that Milton has the largest per cent. of population wage earners in the state. There are 11 churches and good public schools. The government is vested in a burgess and a council of 15 members elected for three years. Pop. (1900) 6,175.

MILTON COLLEGE, in Milton, Wis., a coeducational institution, founded in 1844 by the Seventh Day Adventists as Du Lac Academy; in 1848 the name was changed to Milton Academy, and in 1867 it was incorporated as a college. In 1902 there were reported 12 professors and instructors; 141 students; about 10,000 volumes in the library; grounds, buildings, and apparatus valued at $36,000; productive funds, $84,000; total income about $11,500 per year. In 1901 the benefactions were nearly $4,000. The number of graduates was (1905) about 300.

MILWAUKEE, *mĭl-waw'kē:* city, port of entry, county seat of Milwaukee co., Wis.; on Lake Michigan, the Milwaukee river, and the Chicago and Northwestern, the Chicago, Milwaukee and St. Paul, and the Wisconsin Central railways; 82 m. e. of Madison, 85 m. n. of Chicago: area 21 sq. m.

River and Harbor.—The water front is on a curve of the shore inward, which gives the city an excellent bay, 6 m. wide from cape to cape, and 3 m. inward from an imaginary line between the headlands. The Milwaukee river flows through the city, receiving the waters of the Kinnickinnic near its mouth, and of the Menomonee a little farther up. Both of these branches have been improved by costly operations; and the main stream, by means of a dam at the head of deep water, has been given a depth which permits large vessels to move to the docks near the center of the city. The U. S. govt. has constructed a breakwater in the bay at a cost of over $1,000,000, and provided a spacious harbor of refuge for lake shipping.

Plan of the City.—Immediately n. of the harbor the shore rises 80–100 ft. above the lake and makes a beautiful residential section, and on the w. side the elevation is 125–175 ft., the crown being beautified by costly dwellings and furnishing an admirable outlook. For a goodly stretch along the lake the bluff has been transformed into a public park, with terraces down to the beach. The three river water-courses and the canal are crossed by 2 lift, 8 stationary, and 21 swinging bridges, nearly all of iron. Rapid transit was promoted by the Milwaukee Street Railway Co., which owned the entire street railway system of the city and extensive electric light and power plants; was reorganized after being placed under a receivership; and operated over 145 m. of trolley road.

Public Works.—Some advanced theories in municipal ownership and administration have found a footing. The waterworks property, valued at $5,154,617, is owned by the city, the entire cost of construction and maintenance having been paid out of its proceeds, and its large surplus revenues now aid in defraying other municipal expenditures. A crematory for consuming garbage, which is collected by the health department, is also owned by the city. A free emergency hospital, originally a private benefaction, is maintained at public

expense, likewise three large natatoriums all the year through, and in the summer free public bath houses on the lake beach and swimming schools on the upper Milwaukee river. In many of the public parks, of which there are 21, partly with boulevard connections, free public concerts are given semi-weekly. The total acreage of these parks is 571. Ten of them vary from 20 to 150 acres in extent, the others being small breathing spots distributed in various parts of the city. During six winter months, free public evening lectures for adults are given in public school halls, the expense being borne by the school fund. The city owns exposition grounds, though the building located upon them is the property of a quasi-private corporation. A city hall was completed in 1896 at a cost of $1,200,000, and a library and museum building is valued at $1,168,000, with contents. The library comprises 150,000 volumes. There are 239,291 specimens in the museum, including a remarkable collection of 5,244 different kinds of birds' eggs and nests, and of 2,529 arms and military accoutrements representing all nations and eras. Among the notable public works is a flushing tunnel connecting the Milwaukee river with the lake, water being pumped from the lake into the stream in such quantities as to cleanse the channel whenever required to prevent offensive conditions. A system of intercepting sewers paralleling the streams has been constructed.

Trade and Industries.—Its harbor facilities have made Milwaukee a manufacturing city chiefly. All of the rivers being navigable, and the present channels supplying a dockage of 23.63 miles available to vessels, hundreds of manufacturing establishments are located on the upper reaches of the streams, with slips for additional vessel facilities. The Milwaukee and Menomonee rivers are each provided with turning basins that can be used by the largest lake vessels, and a large turning basin in the Kinnickinnic river, a mile from the harbor entrance, will soon be constructed. The deepest draft vessels can navigate the rivers and canals. The fleets of six independent steamship lines, and a fleet of car-ferries that is operated uninterruptedly all the year, furnish the water transportation to Milwaukee manufacturers. Iron and copper ore and lumber from the Great Lakes districts, and coal from the mines of the middle states are thus transported cheaply. Three great railroad systems and their connections supply rail transportation facilities. According to the U. S. census of 1900 there were 3,342 manufacturing establishments, employing $110,363,854 capital, and 48,328 persons, paying $20,240,656 for wages and $65,118,719 for materials; and yielding products valued at $123,786,449. The principal articles were, foundry and machine shop products, $14,495,362; malt liquors, $13,893,390; leather, $10,267,835; iron and steel. $7,410,213; flouring and grist mill products, $6,357,983; slaughtering and meat packing, $5,980,340; clothing,

men's and women's, $5,483,666; carpentering, $3,324,734; boots and shoes, $2,397,350; malt, $2,317,870; agricultural implements, $2,296,888; bread and other bakery products, $2,157,802; and enameling and enamelled goods, $1,708,171. From 1880 to 1890 the total product of the city's industries increased 147 per cent. During the following decade the increase was 88.6 per cent. The manufacturing statistics for 1902 are as follows: Persons employed, 78,150; paid in wages, $41,434,131; capital employed, $153,202,051; value of products, $230,316,562. The total volume of wholesale business amounted to $326,371,153. The sum of $8,153,180 was expended in new buildings.

Churches.—In 82 of the 162 churches, sermons are preached in foreign languages, including German, Polish, Dutch, Scandinavian, Welsh, Bohemian, Russian and Italian. The seat of a Catholic archbishopric and of a Protestant Episcopal bishopric are located in Milwaukee. The 162 churches are distributed among the following faiths and creeds: Adventist, 1; Baptist, 9; Catholic, 31; Christian, 1; Christian Science, 4; Congregational, 8; Episcopal, 12; Evangelical, 7; Evangelical Association, 6; Jewish, 6; Lutheran, 38; Free Methodist, 2; Methodist Episcopal, 18; Mormon, 1; Presbyterian, 11; Reformed, 2; Spiritualistic, 2; Unitarian, 1; Theosophist, 1; Salvation Army barracks, 1; People's pulpit, 1. The property of the religious organizations is valued by the tax commissioner's department at $6,411,940. Some of the church edifices are architecturally beautiful, notably St. Paul's church, in the Norman style; St. Josaphat's, Byzantine; Gesu, Immanuel and St. James, Gothic. The convent of Notre Dame, which occupies a square in the heart of the city, is the mother house of the Order in the United States. In the suburb of St. Francis, the Catholic seminary of Pio Nono is surrounded by a magnificent tract of 200 acres. Marquette College (Catholic) and Concordia College (Lutheran) are located on the West Side.

Education.—There are 54 public schools, including a school for the deaf-mutes and four high schools. The total enrolment is 36,000. A state normal school, with an enrolment of 300 students, is the main source of supply for the teaching corps. Every primary and district school in the city, with two exceptions, has a kindergarten department, Milwaukee having been the pioneer city in the United States, a quarter of a century ago, to institute kindergarten instruction as part of the regular work in every school building below the high school grade. There are 71 parochial and private schools, with a total enrolment of nearly 22,000. In addition to the institutions heretofore mentioned, the Milwaukee-Downer College for young women is located here, in a group of buildings recently completed in the northern suburban district near Lake Michigan. Part of its endowment is obtained from an organization of

600 women known as the College Endowment Association, who conduct annually series of University Extension lectures for their own members in the Athenæum building. The Athenæum is owned by the Woman's Club, was built by them and is maintained as a successful business venture by them. The Layton Art Gallery, managed through a board of trustees, is open to the public without admission charge, and is the gift of Frederick Layton. The Johnston Emergency Hospital building was given to the city by John Johnston.

Government.—The elective city officers are a mayor, treasurer, comptroller, attorney and a common council consisting of two aldermen from each of the 23 wards, chosen biennially. The administrative functions are vested in appointive boards whose titles indicate their duties: Board of school directors (23), board of public works (4), public debt (3), city service commission (4), fire and police commission (4), school commission (4), public library board (9), public museum board (9), park board (5), emergency hospital board (9). All of the boards and commissions with a membership of four are required by law to be bi-partisan. Certain features of their administration and organization are peculiar to Milwaukee. The total number of persons in city service is 3,111, and 2,923 of these are under civil service rules with tenure of office during good behavior, leaving but 188 persons, including elective and honorary officers, not subject to such rules. The firemen and policemen were prior to 1885, when a bi-partisan board was created, removable for political causes; the official and labor service was placed within the shelter of a bi-partisan board's rulings in 1895; the school department has not been affected by politics since 1897. The school board organization is peculiar to Milwaukee. The school commission is bi-partisan, the mayor appointing one member of the four annually. Their sole duty is to select one-third the membership of the board of school directors annually on a strictly non-partisan basis. The library and public museum boards are composed of three aldermen and six 'citizen members' each, the library board electing its members as terms expire, except the aldermanic contingent, whom the mayor appoints. In 1902 the city had an assessed valuation of $171,881,364, of which $137,404,081 was on real estate and $34,477,283 on personal property. The tax rate was $23.37 per $1,000. Total tax levy for the year was $3,334,935.99. Property was assessed at about one-half market value. Total bonded debt 1903, Jan. 1, was $7,152,750 (including a water debt of $578,750), sinking funds held $418,800, making the net debt $6,733,950. Most of the bonds are subject to an annual call of about 5 per cent of the original issue.

History.—The first permanent settlement of Milwaukee is usually dated from 1818, when Solomon Juneau

erected his little log cabin on the east side of the Milwaukee river. French and English traders had been here before that date, and a procession of Jesuit priests and French voyageurs had preceded them. The first recorded visit of a white man on the site of the future city is in the journal of Father Zenobe Membré, a Recollet missionary priest who accompanied Robert Cavalier de la Salle on his memorable exploratory trip from Lake Erie to the Illinois country in 1679. He notes that both Mascoutens and Foxes were dwellers 'on the banks of the river called Melleoki.' John François Buisson de Saint Cosme journeyed in 1699 along the west shore of Lake Michigan from Michilimackinac to the Mississippi. 'On the seventh,' he wrote, 'we arrived at Melwarik (Milwaukee). This is a river where there is a village which has been considerable and inhabited by the Mascoutens and Foxes, and even some Pottawattamies.' The word Melleoki and its numerous variants, which by a process of evolution has become Milwaukee, is of Pottawattami origin and signifies 'good land.' Another definition accepted by some historians is 'council place,' this having been regarded as neutral territory by different tribes of Indians. The dwellers in the old Indian village were evidently a turbulent set, for Colonel Arent de Peyster, commandant at Michilimackinac, wrote of them in the early years of the Revolutionary War as 'runagates—a horrid set of refractory Indians.' Lieutenant James Gorrell, whose British regulars occupied the stockade at Green Bay in 1762 and gave it the high-sounding title of Fort Edward Augustus, wrote the name of the place as 'Milwacky.' An English trader lived among the Indians at this place in that year. Fur traders made brief stays in the village from time to time. Alexander Lafromboise and his brother were located as traders here in 1785, with a large stock of goods. In 1795 Jean Baptiste Mirandeau, a Canadian blacksmith who had married an Indian woman, built a cabin and made himself useful to the Indians by mending their firearms. He received as compensation game and furs. He died in 1819, being survived by a family of 10 children, who joined the Indians when the Milwaukee band was removed. Thomas Gummersall Anderson, the son of a Loyalist, was a resident upon the site of the future city of Milwaukee from 1803 till 1806. He took an active part in the capture of Prairie du Chien by the British during the War of 1812. When Solomon Juneau arrived in 1818, he found a Pottawattamie village. He settled on the east side of the Milwaukee river, which later was called Juneautown; the west side of the river became Kilbourntown, after Byron Kilbourn (1834), and George H. Walker gave the name of Walker's Point (1834) to the region south of the Menomonee river. Each of the three natural geographical divisions became the nucleus of a little community, and acrimonious rivalry was a natural re-

sultant. The different names of streets on opposite sides of the rivers, now connected by 28 bridges, are a survival of the bitter feelings then engendered. The village of Milwaukee, now the East Side, was organized 1837, Feb. 27. Kilbourntown, now the West Side, was annexed 1839, March 11; and Walker's Point, now the South Side, 1845, Feb. 5. The city was incorporated 1845, Feb. 5, and Solomon Juneau chosen the first mayor.

Noted Fires.—In the early morning of 1883, Jan. 10, a fire broke out in the basement of the Newhall House, and, communicating with the elevator shaft, in an incredibly short time had cut off all means of exit from the upper floors. Scores of the imprisoned guests and employees threw themselves from the windows, only to be crushed to death upon the pavement or railings below. It required weeks to fully explore the ruins and recover the remains of the victims. Nearly 100 lives were lost in this fire.

The most serious loss of property by fire in the history of the city occurred 1892, Oct. 28. By this fire there were nearly 300 buildings destroyed. All but two of the wholesale grocery houses of the city, many other commercial and manufacturing concerns, a part of the gas works, several hundred freight cars, and a large number of dwellings were burned. Over 2,000 people were rendered homeless by this fire. The loss was nearly $4,000,000.

Population.—(1840) 1,712; (1850) 20,061; (1860) 45,246; (1870) 71,440; (1880) 115,578; (1890) 204,-468; (1900) 285,315.

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MÎMÂNSÂ [from the Sanskrit *mân*, to investigate; hence, literally, investigation]: collective name of two of the six divisions of orthodox Hindu philosophy: see SANSKRIT LITERATURE. It is distinguished as *Pûrva-* and *Uttara-mîmânsâ*, the latter being more commonly called *Vedânta* (q.v.), while the former is briefly styled *Mîmânsâ*. Though the M. is ranked, by all native writers, with the five other philosophical systems, the term philosophy—as understood in a European sense—can scarcely be applied to it; for the M. is concerned neither with the nature of the absolute or of the human mind, nor with the various categories of existence in general—topics dealt with more or less by the other five philosophies; its object is merely to lay down

a correct interpretation of such Vedic passages as refer to the Brâhman'ic ritual, to solve doubts wherever they may exist on matters concerning sacrificial acts, and to reconcile discrepancies—according to the M., always apparent only—of Vedic texts. The foundation of this system is therefore preceded by a codification of the three principal Vedas—the R'ik, Black-Yajus, and Sâman—and has in view the existence of schools and theories which, by their different interpretations of the Vedic rites, had begun to endanger, or, in reality, had endangered a correct, or at least authoritative understanding of the Vedic texts. It is the method, however, adopted by the M. which imparted to it a higher character than that of a mere commentary, and allowed it to take rank as a philosophy; for, in the first place, the topics explained by this system do not follow the order in which they occur in the Vedic writings, especially in the Brâhma'na portion of the Vedas (q.v.); they are arranged according to certain categories, such as authoritativeness, indirect precept, concurrent efficacy, co-ordinate effect, etc; and secondly, each topic or case is discussed according to a regular scheme, which comprises the proposition of the subject-matter, the doubt or question arising upon it, the *primâ-facie* or wrong argument applied to it, the correct argument in refutation of the wrong, and the conclusion devolving from it. Some subjects treated of in the M., incidentally as it were, and merely for sake of argument, belong more to the sphere of philosophic thought than to that of commentatorial criticism; e.g., the association of articulate sound with sense, the similarity of words in different languages the inspiration or eternity of the Veda, the invisible or spiritual operation of pious acts, etc. The reputed founder of this system is Jaimini—of unknown date—who taught it in 12 books, each subdivided into four chapters, except the 3d, 6th, and 10th books, which contain eight chapters each; the chapters are divided into sections, generally comprising several Sûtras or aphorisms, but sometimes only one. The extant commentary on this obscure work is the *Bhâshya* of 'Sabara-swâmin, which was critically annotated by the great M. authority, Kumârila-swâmin. Out of these works, which, in their turn, quote several others, apparently lost, have arisen many other writings, explaining and elucidating their predecessors. The best compendium, among these modern works, is the *Jaiminîya-nyâya-mâlâ-vistura*, by the celebrated Mâdhavâchârya (q.v.).

MIME, n. *mīm* [L. *mimus;* Gr. *mimos*, a farcical entertainment, the actor in it, a mime: Gr. *mimo*, an ape: comp. Basque, *mama*, to mask one's self in a hideous manner]: *formerly*, a kind of farce; a dramatic performance among the ancient Greeks and Romans; an actor in such (see MIMES). MIMETIC, a. *mĭ-mĕt'ĭk*, or MIMET'ICAL, a. *-ĭ-kăl*, apt to imitate; imitative. MIMIC, a. *mĭm'ĭk*, or MIM'ICAL, a. *-ĭ-kăl*, inclined to imitate the manners and peculiarities of another. MIM'ICALLY, ad.

-ĭĭ. MIMIC, n. one who imitates the voice, gestures, and manners of another, in order to excite laughter; an actor: V. to speak or act like another in order to excite laughter or ridicule; in *zool.*, to assume, as certain animals do, the dress of other species or a close resemblance to natural objects; there is no evidence that such action is voluntary. MIMICKING, imp. *mĭm'ĭk-ĭng.* MIMICKED, pp. *mĭm'ĭkt.* MIMICRY, n. *mĭm'ĭk-rĭ*, the imitation of the voice, gestures, and manners of another, for sport or ridicule.—SYN. of 'mimic, v.': to counterfeit; mock; aim; imitate.

MIMES, *mīmz:* certain dramatic performances among the ancients, in which, with little attempt at art, scenes of actual life were represented, sometimes in improvised dialogue. The Greek M. appear to have been invented by the Greeks of Sicily and s. Italy. They were a favorite amusement of convivial parties, the guests themselves being generally the performers. Sophron of Syracuse, about B.C. 420, composed many in the Doric dialect, which were much admired, and which Plato was accustomed to read.—The Roman M. were not borrowed from the Greek, but were of native Italic growth. They were not only far ruder and coarser, but in some respects they were essentially different—the dialogue occupying a smaller place, and mere gesture and mimicry predominating. The humor and satire, however, were often genuine, though rough, and even indecent, and they were greatly relished by all classes; even the patrician Sulla was fond of them.

MIMETITE, n. *mĭm'ĕ-tīt*, or MIMETESITE, n. *mī-mĕt'-ĕ-sīt* [Gr. *mimētēs*, an imitator]: a mineral, arseniate of lead, occurring in regular six-sided prisms, of a yellowish-brown color—so called from its resemblance to pyromorphite.

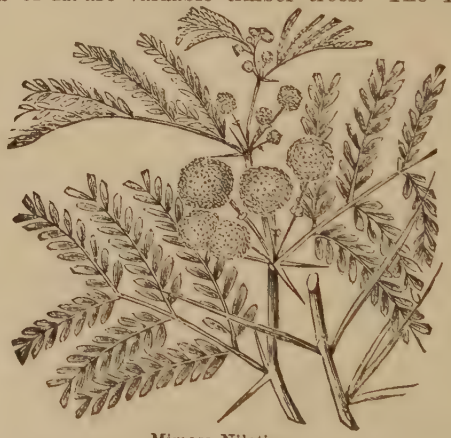
MIMIC, MIMICRY: see under MIME.

MIM'ICRY, in Biology: form of resemblance, wholly external and visible, and not due to kinship, by which a more defenseless and less numerous species, e.g., of butterflies, gain protection through their enemies mistaking them for another species, which some offensive odor or taste secures against attack. The studies of W. H. Bates, in *The Naturalist on the River Amazon*, 1863, first brought out, and adequately explained, the varied and surprising facts of M., which, so far as noted by earlier observers, had been considered one of the inexplicable curiosities of nature. In the Amazon valley, the richest butterfly region in the world, Mr. Bates found many species of butterflies, which are eatable by insect-devourers, but are, to a large extent, not attacked, because they closely resemble other more abundant species, which are protected by their offensive odor or taste. The acquisition of this protective resemblance has preserved the species, when otherwise their enemies would have destroyed them. The principle prevails very widely throughout nature. Wherever an extensive group is

protected, either by distastefulness or by offensive weapons, there are usually some species of eatable and inoffensive groups that gain protection by imitating them. The distasteful or offensive beetles, butterflies, wasps, bees, or ants thus afford protection to their imitators; poisonous snakes to non-poisonous, which mimic them; and, among birds even, the sparrow-hawk is related to the weak and defenseless cuckoo through M., and the powerful and noisy 'Friar-birds,' of the Malay Archipelago, protect the orioles, through the latter having gained resemblance to the former. Wallace in his *Darwinism*, 1889, explains the place of M. in nature. It is a curious fact that, while among land animals the number of known cases of M. is very large, among aquatic creatures it is very small.

MIMOGRAPHER, n. *mĭm-ŏg′ră-fẽr* [Gr. *mimos*, a mimic; *graphō*, I write]: a writer or actor of farces.

MIMOSA, n. *mĭ-mō′ză* [Gr. *mimos*, an imitator]: genus of leguminous plants including many species, one of which is the sensitive plant, so called from the leaves being more or less sensitive to the touch, sub-ord. *Mimōsĕæ*, ord. *Leguminōsæ*. MIMOSEÆ, sub-order of *Leguminosæ*, one of the largest nat. orders of exogenous plants; distinguished by regular flowers and petals valvate in bud: 28 genera and about 1,100 species are known, all natives of warm climates, a few only extending beyond sub-tropical regions in the s. hemisphere. The genera *Acacia* (q.v.) and *Mimosa* are best known. To the latter genus belong the Sensitive Plants (q.v.). Some of the larger species of M. are valuable timber trees. The TALHA



Mimosa Nilotica.

(*Mimosa ferruginea*) is one of the most common trees of central Africa. They are trees also of great beauty. Some species of the genus *Prosopis*, natives of the w. parts of South America, are remarkable for abundance of tannin in their pods.

MIMULUS, n. *mĭm′ū-lŭs* [dim. of L. *mimus*, a mimic actor—so named from the resemblance of the corolla to a mask]: genus of herbaceous plants of nat. order *Scrophulariaceæ*, having a prismatic 5-toothed calyx, a somewhat bell-shaped corolla, of which the upper lip is bifid and the lower lip trifid, the lobes not very unequal, two long and two short stamens, and a stigma of two lamellæ, which close together upon irritation. The species are mostly natives of America. Some are very frequent in flower-gardens, and many fine varieties have resulted from cultivation. They sometimes receive the name *Monkey-flower*. One species, *M. luteus*, native of Peru and Chili, has become naturalized in many parts of Britain. The little yellow-flowered MUSK PLANT, now so common in gardens and on window-sills in Britain, is *M. moschatus*, a native of Oregon and other north-western parts of America.

MINA, n. *mī′nă* [Gr. *mna;* L. *mina*—from an oriental word *maneh*, signifying weight]: among the *ancient Greeks*, *Romans*, or *Jews*, a weight; a coin. The Greek M. or Mna contained 100 Drachmæ (see DRACHM), and was the 60th of a talent; consequently, as a *weight*, it was equivalent to about $1\frac{1}{3}$ lb. avoirdupois, varying in different districts to the extent of one-third of a lb. more or less, following the fluctuations of the talent itself. As a *money of account*, it preserved the same relation to the talent, and was probably (on a general estimate) worth between $19 and $20.—M. or *Maneh* was also a Hebrew weight and money denomination; it was $\frac{1}{60}$ (or $\frac{1}{50}$) of a talent, and contained 50 shekels: its modern equivalent is roughly estimated at 2 lb. 6 oz. in weight, and somewhat more than $25 in money. But different localities had different standards and usages, and there were many fluctuations. See DRACHM: SHEKEL: TALENT.

MI′NA BIRD (*Eulabes Indicus* or *Gracula Indica*): species of Grakle (q.v.), or of a nearly allied genus, native of many parts of the E. Indies, about the size of a common thrush, of deep velvety black color, with a white mark on the base of the quill-feathers of the wings, yellow bill and feet, and two large bright yellow wattles at the back of the head. The bill is large, conical; the upper mandible a little curved and sharp-pointed. The food of the M. B. consists of fruits and insects. It is very lively and intelligent, and possesses a power of imitating human speech excelled by none of the parrots. It has sometimes been trained to repeat sentences of considerable length. It is therefore in great request, and is often brought to Europe.—Another and larger species is found in Sumatra and some of the other eastern islands, possessing the same power of articulation. It is highly prized by the Javanese.

MINAMOTO, or GEN: ancient noble family in Japan, for many centuries milit. vassals of the mikados. The M. family was founded by two grandsons of the 57th mikado, Seiwa (reigned 859–76). The two M. branches, descended from these princes, have supplied hundreds of milit. leaders to the service of the mikados. Yoritomo, the earliest shogun, or gov.-generalissimo, about the end of the 12th century, who became the real ruler, while the mikado's power was but nominal, was of the M. family. It was under the leadership of M. generals that the whole of e. and n. Japan, above 36° lat. n., was conquered, the aboriginal tribes made subject to the court at Kioto, and the mikado's sway extended even into Yezo. 17 noble families of the mikado's court are of M. descent; among them, Iwakura, Ohara, Higashi, Kuze, and others prominent in the govt. of Japan. The M. crest is three bamboo leaves surmounted by gentian flowers.

MINARET, n. *mĭn'ă-rĕt* [Sp. *minarete*, a high slender turret—from Ar. *mamârat*, a lamp, a lantern]: the lofty turret frequent in Saracenic architecture. It contains a staircase, and is divided into several stories, with balconies from which the priests summon the Mohammedans to prayer—bells not being permitted in their religion —and is terminated with a spire or ornamental finial. The minarets are among the most beautiful features of Mohammedan architecture, and are an invariable accompaniment of the Mosques (q.v.). In India, *Minars*, or pillars of victory, are frequently erected in connection with mosques; some of these are lofty and splendid monuments, that of Kootub, at Old Delhi, being 48 ft. 4 inches in diameter at base, and about 250 ft. high. The form of the M. was derived from the Pharos (q.v.), the ancient light-house of Alexandria.

MINAS GERAES, *mē'nâs zhā-râ'ĕs*, almost *zhā-rīs'*: interior prov. of s.e. Brazil; an extensive and elevated table-land; 220,160 sq. m., intersected by mountain-chains, which send out minor ridges in every direction, inclosing extensive valleys, of fertile soil, and watered by large rivers. The chief summits are Itambi, 5,950 ft., and Itacolumé, 5,750. The chief river is the Sâo Francisco. The tropical situation of M. G. gives it luxuriant vegetation; forests rich in valuable timber and fine woods; and fields plentifully yielding corn, cotton, tobacco, coffee, millet, etc.; yet its elevation, about 2,000 ft. above sea-level, secures a healthful climate. The plains and the rich valleys furnish abundant pasture for cattle and hogs. Trade with adjacent states includes, export of coffee, tobacco, cotton fabrics, bacon, cheese, hogs, cattle, drugs, and precious stones; and import of wheat, flour, wine, salt, and manufactures. Manufactures are largely carried on, and embrace cotton and woolen goods, iron, rum, sugar, tobacco, wool, hats, etc. Communication from Rio de Janeiro, cap. of Brazil, is by a branch of the great Dom

Pedro II. r.r., built by the state, at a cost of $50,000,000, to connect M. G. and San Paulo, the most populous and prosperous province of Brazil, with the cap. The branch to M. G. passes from Entre Rios over the ranges of intervening mts. to Ouro Preto. There is a lack of good roads, necessitating the carriage of goods on the backs of mules. The formerly rich gold mines of M. G., the most valuable in Brazil, whence the name M. G. had its origin, have been mostly abandoned, either agriculture or diamond-mining being preferred, and the govt. having, at the discovery of diamonds, 1746, compelled closing of the gold mines in favor of the search for diamonds.

The history of M. G. as a prov. dates from 1833. It is divided into 14 districts; the cap. is Ouro Preto; other towns are Minas Novas, Mariana, Januaria, Diamantina, Sao Joao d'El Rey, etc. The chief towns have colleges, and a system of primary and grammar schools extends through the prov. Pop. (1888) 3,018 807.

MINATITLAN, *mē-nâ-tē-tlân′:* town of Mexico, on the n. side of the Isthmus of Tehuantepec; 20 m. from the coast, by way of Coatzacoalcos river, on whose w. bank it is built, on low ground subject to periodical inundations. Cattle are raised, and these, with mahogany and other valuable woods, are its chief wealth. They are shipped at Vera Cruz, 125 m. n.w. Its connection by river with the Gulf of Mexico has suggested M. as the point of departure for an interoceanic canal across the isthmus, and also of a r.r. across to the Pacific.

MINATORY, a. *mĭn′ă-tĕr-ĭ* [L. *minatōrĭŭs*, threatening —from *minārī*, to threaten]: threatening; menacing.

MINCE, v. *mĭns* [OF. *mincer*, to cut into small pieces: F. *mince*, thin, slender: It. *minuzzare;* F. *menuiser*, to break or cut small]: to cut or chop into small pieces; to walk with affected nicety; to omit a part for the purpose of suppressing the truth; to palliate; to extenuate; to speak with affected softness, and imperfectly. MINCING, imp. *mĭn′sĭng:* ADJ. having the character of that which minces; that chops into small pieces: N. affectation. MINCED, pp. *mĭnst:* ADJ. chopped into very small pieces. MIN′CINGLY, ad. *-lĭ*, in small parts; not fully; affectedly. MINCE-MEAT, a sweetmeat whose principal ingredients are raisins, currants, brandy, etc., and a small portion of finely cut meat. MINCED-MEAT, meat cut or chopped fine; the state of being nearly or wholly destroyed, as if cut into *minced-meat.* MINCE-PIE, a pie or pastry containing mince-meat. NOT TO MINCE MATTERS, neither to suppress, extenuate, or weaken the force of, as of the words of another.

MINCH, *mĭnch:* channel separating the island of Lewes from the counties of Cromarty and Ross, in n.w. Scotland. Its shores are exceedingly irregular; average width is about 28 m. The *Little Minch*, separating the island of Skye from that of North Uist and the neighboring islands in the Outer Hebrides, is more than 15 m. in width.

MINCIO, *mĭn'chō* (anc. *Mincius*): river of northern Italy, continuation of the Tyrolese stream, the Sarca. It emerges from Lake Garda at Peschiera, and after a course of about 38 m. through the province of Mantua, which it separates from Verona, falls into the Po, 8 m. below the city of Mantua. The Mincio has constituted an important basis of operation during the wars between Italy and Austria.

MIND, n. *mīnd* [AS. *gemynd*, memory, mind: Icel. *minni*, memory; *minna*, to remember: Ger. *meinen*, to think: Gael. *meinn*, mind: L. *mens* or *mentem*, mind; *memĭnī*, I remember]: intelligent power; the understanding; the power by which we perceive, think, or reason; intention; choice; purpose; thoughts; opinions; remembrance; recollections: V. to attend to; to regard with attention; to obey; to incline; to be inclined, as do you mind going; in *OE.*, to remind. MIND'ING, imp. MIND'ED, pp.: ADJ. disposed; inclined—much used in composition, as in *high-minded, low-minded, feeble-minded, double-minded.* MIND'LESS, a. *-lĕs*, stupid; heedless. MIND'EDNESS, n. *-nĕs*, inclination toward anything. MINDFUL, a. *mīnd'fûl*, attentive; heedful; observant. MIND'FULLY, ad. *-lĭ*. MIND'FULNESS, n. *-nĕs*, the quality of being mindful; regard. TO MAKE UP ONE'S MIND, to come to a decision; to determine. NEVER MIND, do not regard; it is of no consequence.—SYN. of 'mind, n.': intellect; spirit; soul; capacity; liking; inclination; affection; disposition; sentiments; memory;—of 'mind, v.': to notice; mark; regard; observe; attend to; heed.

MIND: mind is a term which, like consciousness, cannot be defined without using it or some synonym of it in the definition. The mind may be considered as that which experiences or permits consciousness, or as that consciousness itself. The term is used more or less interchangeably with several other terms, from which, however, some distinctions ought to be observed. Consciousness is one of these terms and applies to any state of mind, as sensation, feeling, will, etc., but with the emphasis rather definitely on the momentary state as momentary, whatever that may chance to be. The term mind in contradistinction to this, emphasizes the relatively *permanent unity* of these states of consciousness, whether this unity be thought of as a substrate of brain activities lying below the level of passing consciousness, or as an immaterial essence behind the scenes of overt mental life. The term soul is often used as equivalent to mind, although the common connotation of the word would imply a more spiritual entity than is generally involved in the use of the term mind. It must be admitted, however, that one usage recognizes the 'animal soul,' which is essentially synonymous with the concept of life. Finally, 'spirit' is sometimes used as connected so intimately with 'mind' as to render the two things hardly separable. The term spirit has nowadays for the most

part a religious and theological import. It appears, for example, whenever the question of immortality is at issue.

Psychology knows nothing of mind beyond what mind *does* and what its states *appear* to their possessors to be. Much is now known to this science as to how the mind grows and how it operates, what its limitations are and what the principles of its organization. But outside these bounds, whence the mind came, whither it is going, what its inner essence is as compared with the structure of physical matter, these are questions to which science at present has no sure answer. Indeed, it is disposed to consider them rather juvenile. If we know how a thing operates and, if it be a living thing, how it grows, we possess the most important practical knowledge about it. The rest may be safely left to curious speculation. For a discussion of certain fundamental properties of mind see the following terms: SENSATION, PERCEPTION, MEMORY, IMAGINATION, REASONING, FEELING, WILL, EMOTION, SUBCONSCIOUSNESS. See also MIND AND BODY.

MINDANAO, *mēn-dâ-now':* Philippines, the most southeastern and largest island of the archipelago, lying between lat. 5° 35′ and 9° 50′ n. and between long. 121° 53′ and 126° 28′ e., n.e. of Borneo. It is bounded on the e. by the Pacific ocean and on the w. by the Sulu sea; area 45,356 sq.m.; with its dependent islands 46,521 sq.m.

Topography and Climate.—The outline of the island is very irregular, and the coast is uneven and much indented with deep bays and inlets; the shore line is 1,592 m., and the width of the island from e. to w. 386 m. The island is very mountainous, particularly in the interior, the mountain system consisting of a number of irregular ranges extending generally n. and s., and as a rule approaching near the coast. The mountain formation shows the effect of earthquake and volcanic action, and there are many volcanoes, some of which are active. The principal peaks are Apo (10,312 ft.), near the southeastern coast, and Malindang (8,560 ft.) in the n.w. The island is drained chiefly by two large rivers, the Grande de Mindanao (q.v.), flowing s.w. and w., on the western side of the central mountain range, and the Butuán or Agusán, flowing n.w., on the eastern side of the same range. There are numerous other smaller streams and nine large mountain lakes. There are iron springs at Placer, in the province of Surigao; sulphur springs at Mainit, Surigao, and Balingasag, Misamis, and medicinal thermal springs at Malĭbato. As the island is within 10° of the equator, the climate is hot and humid, but more equable than that of Luzon; rains are frequent and heavy.

Forests and Fauna.—The island is covered with forests of valuable woods for ship and house building and furniture making; among these are the molave narra (similar to the yellow pine), teak, ebony and cypress; the gum and resin producing trees and medicinal and dye plants

also grow abundantly. Animal life is abundant in these forests; over 200 species of birds have been classified, of which 17 species are peculiar to Mindanao and Basilan; deer, wild hogs, monkeys, and the haguang or colugo (q.v.) are numerous. Reptiles, including the giant lizard, iguana, and large snakes, particularly the boa, also infest the forests and crocodiles the river.

Industrial Resources.—The staple agricultural products are rice, sugar, cotton, corn, tobacco, indigo, coffee, and hemp; in 1899 Mindanao ranked fifth among the hemp-producing sections of the Philippines; other products of special value are cloves, nutmegs, cinnamon, and other spices, betel nuts and betel peppers. The most important industry is the cultivation and shipment of hemp, and forest products; large herds of cattle and horses are raised; and there is a little weaving of hemp and cotton fabrics for home use. Edible birds' nests are also gathered and exported. Communication is largely by water, as there are few roads except in the immediate vicinity of the chief towns, and the towns and villages are situated on the coast or on the large lakes and rivers. Gold is obtained is small quantities by the natives, and is doubtless abundant; coal, sulphur, copper and platinum are also reported.

People and Government.—Mindanao is peopled mostly by tribes of the Moro race, among whom the Mohammedan religion is dominant; Visayan peoples inhabit the provinces of Misamis and Surigao. The island was first occupied by United States troops in 1899, and since that time numerous garrisons have been established, and operations carried on with a view of regulating intercourse between the Filipinos and Moros, and of gaining the confidence of the people. The provinces of Misamis and Surigao were placed under civil government in 1901, the rest of the island remained under military control until 1903, June, when a law was passed by the Philippine Commission, providing civil government for Mindanao (exclusive of the two provinces mentioned above) and its adjacent islands, under the name of the Moro Province. Pop. 495,660. See PHILIPPINE ISLANDS; MOROS.

MINDANAO, GRANDE DE: a large river of the island of Mindanao, Philippines. It rises in the Rangayán mountains, flows s. to the Lake of Liguasan, and passing through this lake flows n.w. to Illana bay. About 25 m. from its mouth it divides into two branches, which enter the bay about 5 m. apart, with a large delta between them; the n. arm is the larger and more navigable; the s. arm is narrow and only 5 ft. in depth. The river is navigable for 70 m. for small vessels not drawing over 4 ft. Its course is mostly through a very fertile region, and it drains an extensive plain with several large lakes; in length and volume it is the largest river of the Philippines. In the upper part of its course it is known also as the Pulangui.

MIND AND BODY, THE INTER-RELATION OF (THEORIES). One of the oldest and one of the most persistent problems of philosophy is that of the mutual relations that obtain between consciousness and the physical world. One important part of this problem is concerned with the relation in which the mind stands to the body and its functions. It is obvious that the question involves an investigation into the nature of mind and of physical objects; for the essential connection between these things can be determined only when they have been brought together in a general theory of reality. In this connection, two tendencies are apparent in the history of philosophy; consciousness and the physical objects are (1) either regarded as ultimately different (the various forms of *dualism* [q.v.]) or (2) they are regarded as different appearances or aspects of a single reality (*monism* [q.v.]). Dualism has to show how two objects of different nature can maintain intimate relations; hence the theories of *causal interaction, parallelism* and *pre-established harmony.* Monism, on the other hand, having once declared for the real identity of mind and body, is called upon to explain how like objects or the same identical object can—as consciousness and as physical organism—appear totally different; hence the theories of *epiphenomenalism, panpsychism* and certain (monistic) forms of *parallelism.*

In psychology, the relation of mind to body presents quite a different problem. It becomes a problem of science, not of philosophy. The psychologist seeks to determine how, in the concrete, a given mental state or process or sequence of processes is related to, dependent upon, or conjoined with, given bodily processes or changes. With the questions of ultimate nature and of the final significance of the relation under discussion, the psychologist is not concerned. Psychology finds that mental processes are, as a matter of fact, connected with, conditioned by, physiological processes. The science proceeds therefore upon the *principle of parallel occurrence.* This principle is not, however, to be confused with the various philosophical theories of parallelism. It rests upon and proclaims psychophysical facts rather than a metaphysical doctrine intended as an interpretation and explanation of the facts.

MIND CURE: the theory or the practice of curing disease mainly by mental influence. If the result secured were dependent principally upon the effect of mind, it should be called mind cure, even though the healer or the patient or both believe the cure to be wrought by other agencies.

The following is a partial list of the agencies the results of which should probably be attributed to mind cure, although such an explanation is not usually admitted: absent treatment, amulets, anointing with oil, bits of the sacred cross, bones of saints, bread pills,

charms, Christian science, divine healers, electric belts, exorcism, faith cure, finger rings made from nails of a coffin, hands of executed criminals, some home remedies, hypnotism, idols, knee caps of lambs, laying on of hands, mental science, magnets, metal tractors, mesmerism, mystical rites, some patent medicines, philosophical healing, quacks, relics, right forefeet of female hares in pocket, royal touch, sacred images, sacred water, sacred places, shrines, spider's web pills, sugar pills, suggestion, talismans, thermometers held under tongue, thorns from sacred crown, vegetable electricity, witchcraft, will power.

Most of these agencies have been successful in securing beneficial results. It is quite possible that cures have been wrought by many of them that could not have been wrought in any other way. None of them is able to restore a lost organ or limb, to make sound a decayed tooth, to cope successfully with bacteria or to cure most of the purely organic diseases. Most of them are able to cure—partially or wholly—most organic diseases and such as are specially dependent upon the nervous system. Among the diseases benefited by mind cure the following are noteworthy (condensed from Dr. Bernheim's *Suggestive Therapeutics*): organic diseases of the nervous system, hysterical diseases, neuropathic affections, various neuroses, dynamic pareses, and paralyses, gastro-intestinal affections, various painful affections, rheumatic affections, neuralgias, menstrual troubles. In this list are included many of our most painful and persistent diseases.

The exact method whereby mind cure effects its results is imperfectly understood. We are also ignorant of the method whereby our muscles respond in voluntary movements. We are, however, fully aware of the fact that walking, raising the hand, masticating food, etc., are dependent upon the response of our bodies to our minds. We also know that many purely involuntary acts are dependent upon our thoughts. Thinking of savory viands causes the mouth to water; thinking of the act of swallowing makes the process difficult—hence the difficulty of taking a pill; excitement injures digestion; depressing thoughts change the rate of heart action; embarrassing thoughts cause the blood to rush to the face, etc. In some unknown way the mind may impede or facilitate every bodily process and hence may, especially under the stress of intense feeling, produce or relieve pains and various forms of functional diseases.

Although the mind cure may thus be applied to all forms of functional diseases, there is no warrant for the assumptions (1) that there is no need of drugs and surgery or other material means, or (2) that mind cure may be effective as absent treatment without the co-operation of the patient. Mind cure is most helpful in

preventing disease and in this particular its usefulness is not easily exaggerated. See FAITH CURE.

MIND DUST AND MIND STUFF: the mental particles, elements, atoms, or monads which, according to the view of pan-psychists, make up the universe. The theory results from the attempt to apply the analogy of physical atoms to the mind. The states of the mind are regarded as compounds built up of mental atoms. When all the elements are conceived as alike, the differences in the states of consciousness are explained by the manner of arrangement or combination of the elements. The difficulty is to show how a new quality can arise from the addition of elements which do not contain it. It is to avoid the difficulty of showing how the mind can evolve out of non-mental matter that the assumption is made by W. K. Clifford and others that all matter is mind stuff. The result of this theory is a metaphysical doctrine which is the opposite of materialism. The entire universe is mind; what seems to be matter is the reflection of particles of mind stuff in other mind stuff.

MINDEN, *mĭn'dĕn:* Prussian town, province of Westphalia, on the Weser, about 22 m. w.s.w. of Hanover. It is one of the oldest towns in Germany, a prosperous closely-built city; and was till lately a fortress of the second class. Minden has a stone bridge across the river, dating from 1518, and possesses several ancient churches, the most noteworthy of which is the present Rom. Cath. church, built in the second half of the 11th c., and till 1811 an episcopal cathedral. A battle was fought near Minden 1759, in which the French were defeated by an army of Anglo-Hanoverian troops.—Pop. (1900) 24,327.

For the Hanoverian town of Minden, properly Münden, see that title.

MINDORO, *mēn-dō'rō,* Philippines: an island lying s. of Luzon, a little n. of the centre of the archipelago; length n.w. to s.e., 110 m.; width, n.e. to s.w., 56 m.; area, 4,050 sq.m., with dependent islands, 4,108. There are numerous small rivers, but no general river system of main stream and tributaries. The climate is variable; the rainfall heavy and monsoons frequent; the western coast is temperate and healthy, but the northern and eastern coasts are hot.

At one time, before the decay of the Spanish monarchy, the rice yield was so abundant that Mindoro was called 'the granary of the Philippines'; but the frequent attacks of Moro pirates destroyed the prosperity of the island, and the agricultural products are now unimportant, being almost entirely for home consumption. Rice, sugar cane, cocoa, tobacco, hemp, cotton, etc., are raised; the cultivation of hemp is increasing, and a small amount of cotton is exported to the island of Ipil. In the time of the early Spanish explorers reports of great mineral wealth, especially gold, were circulated; the real

mineral resources are but little known, though as far as modern exploration has gone copper, gold and coal have been found. The island is heavily wooded, and its chief commercial wealth is in forest products; the trees include cedar, ebony, mahogany, gum trees, gutta-percha, palms and dye woods. Near the principal towns wood-cutting and rattan splitting for the Manila market is the chief industry; rattan, burí, honey, forest gums, balao oil, pitch, and other forest products are the chief articles of export; tortoise-shell, obtained from the small neighboring islands, and canoes cut from a single piece of wood are also exported; and there is a considerable production of sago. There are only a few roads, access to inland villages being by mountain trails or by river-canoes; the local trade between coast towns is carried on mostly by native sailing craft; all exports for Manila and other islands are concentrated at ports of call for steamers.

In 1902, June, civil government was extended to Mindoro and adjacent islands, and it was detached from the province of Cavité and made a sub-province of Marinduque. The inhabitants of the interior are wild tribes, among whom the Manguianes predominate; the people of the north coast are mostly Tagálogs, those of the south coast, Visayans. Pop., estimated to include wild tribes of interior, 106,200.

MIND READING: the discovery of the thoughts of another mind. That part of the so-called mind reading entertainment in which there is contact between the agent and percipient, is to be explained by muscle-reading. (See MUSCLE READING.) The question whether there is the possibility of discovering the thoughts of another without physical contact and without known means of communication has been investigated experimentally. The best results are reported when the percipient is hypnotized. It is claimed that it has been possible to get subjects to name substances which the hypnotist is tasting, to carry out actions thought of, to become rigid in a finger decided upon by the hypnotist, to otherwise act on suggestions made only mentally by the agent. Some of these tests were performed with the agent not in the same room. Experiments have also been tried with and without hypnosis in communicating mentally numbers, diagrams, drawings of simple objects, etc. The percentage of success in these tests seems to be greater than would be accounted for by chance; but the facts have to be interpreted with caution. Hansen and Lehmann, of Copenhagen, have found, for example, that involuntary whispering, even with the lips closed might, with a hyper-sensitive subject, explain the communication of numbers. The tendency for two persons to think along similar lines, the possibility of unintentionally giving clues by a glance or gesture, the possibility of unusual sensitivity, the fact that impressions are often received through the senses in ways of which the per-

cipient is not aware, the likelihood of unintentional deception and positive fraud, all have to be taken into account in determining whether there has been any real transference of thought independent of physical means. See TELEPATHY.

MINE, pron. *mīn.* [AS., Sw. and Dan. *min;* Icel. *minn;* Goth. *meins;* Ger. *mein,* my or mine]: the possessive case of the pronoun of the first person; belonging to me; my; that which belongs to me; in Scripture language and in old style, *mine* is put before a noun beginning with a vowel, *mine* iniquity.

MINE, n. *mīn* [F. *miner,* to dig underground, to mine —from id. L. *minārĕ,* to conduct, as along a vein of metal: Gael. *meinn;* W. *mwyn,* ore, a mine; It. *mina;* F. *mine,* a mine]: pit or excavation in the earth, from which ores are dug (see MINES, in Law; MINING): any rich source of wealth or good; an excavation filled with gunpowder for the purpose of blasting rocks, or in war for blowing up an enemy's works (see MINES, MILITARY): V. to sap; to form mines under; to excavate. MI'NING, imp.: ADJ. pertaining to or connected with the forming of mines; N. the art of making pits for the discovery of ores, etc., and everything relating to their systematic management (see MINING). MINED, pp. *mīnd.* MINER, n. *mī'nĕr,* one who works in a mine. MI'NY, *a.* *-nĭ,* abounding with mines or excavations.

MINE GAS. See FIRE-DAMP.

MINER, *mī'nĕr,* ALONZO AMES, D.D., LL.D.: clergyman, educator and reformer: b. 1814, Aug. 17—1895, June 14; b. Lempster, N. H. He studied at an academy, and in 1835 became principal of an academy at Unity, N. H. In 1839 he received ordination as a Universalist minister. He held pastorates in Massachusetts at Methuen, Lowell, and Boston, labored in the anti-slavery and temperance causes, and was prominently connected with the educational interests of the state. He was president of Tufts College 1862-74, was a member of the board of overseers of Harvard College, and was candidate for governor of the state on the prohibitionist ticket 1878, and for mayor of Boston 1893. He founded the Universalist publication house at Boston, edited the *Star of Bethlehem,* and wrote for various periodicals. Among his published works are *Old Forts Taken,* and *Bible Exercises.*

MINERAL, n. *mĭn'ĕr-ăl* [F. *minéral,* a mineral—from *miner,* to mine: Sp. *mineral,* a mineral (see MINE 2)]: any inorganic body which is found on the surface or within the earth; a rock or stone; a metallic ore; a metal: ADJ. of or relating to minerals; impregnated with minerals; formed in or dug out of the earth. MINERALIZE, v. *mĭn'-ĕr-ăl-īz,* to impregnate with mineral matter; to convert into a mineral. MIN'ERALIZING, imp. MIN'ERALIZED, pp. *-īzd.* MIN'ERALIZER, n. *-ī-zĕr,* a substance which combines in an ore. MIN'ERALIZA'TION, n. *-ī-zā'shŭn,* the process of

converting any substance into a mineral; the process of impregnating with a mineral. MIN'ERALIST, n. *-ĭst,* one versed in or employed about minerals. MINERAL ACIDS, in medicine, ordinarily the following: Sulphuric Acid (q.v. *Sulphates*), Nitric Acid (q.v.), Hydrochloric Acid (q.v.), Phosphoric Acid (q.v. PHOSPHORUS), Chromic Acid (q.v.), Carbonic Acid (q.v.). MINERAL-BLUE, the name usually given to *azurite* when reduced to an impalpable powder for coloring purposes. MINERAL-CAOUTCHOUC, *-kô'chôk,* an elastic mineral pitch, a variety of bitumen, resembling caoutchouc in elasticity and softness—also called *elaterite.* MINERAL CHAMELEON (see MANGANESE). MINERAL-CHARCOAL, a term applied to silky fibrous layers of charcoal, which are interlaminated in beds of ordinary bituminous coal—known to miners as mother-of-coal. MINERAL DEPOSITS, term denoting metalliferous ores occurring naturally in geological formations: they consist sometimes of a single native metal, but usually of different metals mixed (see GANG or GANGUE; ORES; VEINS, in geology; MINING; also MINERALOGY; GEOLOGY). MINERAL-GREEN, a native green carbonate of copper. MINERAL-OIL, a familiar term for petroleum or rock-oil, which is found oozing out from strata of all ages, from the Silurian and Devonian upward. MINERAL PITCH (see ASPHALT). MINERAL RESINS (see RESINS). MINERAL-TALLOW, a familiar term for *hatchetine,* remarkable substance found in several places in Britain, Germany, Siberia, etc.; soft and flexible, yellowish white or yellow, resembling wax or tallow, often flaky like spermaceti, inodorous, melting at 115°-170° F., and composed of about 86 carbon and 14 hydrogen. MINERAL TAR (see ASPHALT). MINERAL WATER, water naturally impregnated with mineral matter (see below): also certain beverages artificially prepared (see AERATED WATERS).

MINERAL KINGDOM: inorganic portion of nature. Under this term, however, are not included the immediate inorganic products of organic beings—e.g., sugar, resins, etc., though substances more remotely of vegetable or even animal origin are reckoned among minerals, as coal, fossils, etc. To the mineral kingdom belong liquid and gaseous, as well as solid substances; water, atmospheric air, etc., are included in it. All the chemical elements are found in the mineral kingdom, from which vegetable and animal organisms derive them; but many of the compounds which exist in nature belong entirely to the vegetable and animal kingdoms, and are produced by the wonderful chemistry of life.

MINERALOGY, n. *mĭn'ĕr-ăl'ō-jĭ* [L. *minerale* and Gr. *logos,* a discourse]: the science which treats of the properties and classification of minerals. MINERALOG'ICAL, a. *-a-loj'ĭkăl,* pertaining to mineralogy. MIN'ERALOG'ICALLY, adv. according to the principles of mineralogy. MIN-

ERAL'OGIZE, v.i., *-jīz*, to collect and study minerals. MINERAL'OGIST, n. *-jĭst*, one versed in mineralogy.

Mineralogy deals with the composition, structure and other physical properties, origin and uses of minerals.

A mineral is an inorganic, homogeneous, liquid or solid occurring in nature. It is usually solid under ordinary conditions and has definite and characteristic form.

The first thing that one notices about a mineral is its color. But the more one becomes acquainted with the subject the less he depends upon color as a means of identification, since it is soon evident that a given species may exhibit more colors than any chameleon. The list of colors shown by such a mineral as quartz, for example, reads like a description of the spectrum.

However, color is a means of identification within certain limits, since some minerals are prevailingly light in color (quartz), others black (hornblende); some are red (ruby); others green (emerald); etc. Extended acquaintance shows that color is not only a source of beauty to a mineral but a characteristic useful in its determination.

The next thing that will be noticed is the manner in which light is reflected from the surface of minerals—i.e., the *lustre*. Some minerals look *greasy* (talc). Others have a *vitreous* lustre like broken glass (quartz). Others are *waxy* (chalcedony), or *silky* (satin spar), or *resinous* (sphalerite). Some are *dull* (kaolin), others look like polished metal, i.e., have *metallic* lustre (galena). Metallic lustre is more common on opaque minerals (those which do not permit the light to pass through them) than on translucent minerals (those which in thin sections permit light to pass), or on transparent ones (those which in thick sections permit light to pass freely). The lustre of a transparent mineral most nearly approaching metallic lustre is called *adamantine*, since it is so characteristic of the diamond.

If a mineral has been formed under favorable conditions it will show as definite shape as does a bird or fish or flower. It may be cubical, or pyramidal, or prismatic for example. The prisms of some minerals are four to eight sided. Others are six or twelve sided. Others have two wide lateral planes and narrow front and back planes.

If the characteristic external form is wanting the architecture may often still be discovered by breaking the mineral. Many minerals when struck a sharp blow split or cleave in a definite direction—salt into cubes, fluorite into octahedrons, calcite into rhombohedrons, etc. —thus showing their internal structure. Others simply break or fracture, leaving their broken surfaces smooth or splintery or pitted like a surface composed of shells (*conchoidal fracture*).

Then, again, upon taking a series of minerals in the hand one notices that they differ in weight. A rough estimate only can be made by hand. But if the mineral is weighed, then put in a vessel completely filled with

water and the overflowing water collected and weighed the *specific gravity* or ratio of the weight of the mineral to the weight of the same volume of water is obtained. This is a very characteristic property and hence a valuable means of identification. One does not have to collect the water, however. By employment of some instrument like the Jolly balance he can readily find the weight of the mineral in air (W), then its weight in water (w). The difference (W—w) represents the weight of an equal volume of water. Dividing the weight of the mineral by this gives the specific gravity, *S*. $S = \frac{W}{(W - w)}$.

Minerals differ in hardness. A few can be scratched with finger nail, more with a knife, and some are harder than a knife. Ten minerals have been chosen to form a *scale of hardness.* The softest, talc, is No. 1. Then follow in order gypsum, calcite, fluorite, apatite, orthoclase, quartz, topaz, corundum, and finally diamond, which is No. 10. With the exception of diamond all these minerals are abundant and every one interested can obtain a scale. The finger nail can scratch any mineral not harder than gypsum and the knife any mineral softer than quartz.

These properties—color, diaphaneity, lustre, shape, hardness and gravity—can all be observed by a beginner and studied without any instruments. But for the further investigations which are necessary to thoroughly pursue the subject various instruments are requisite.

To investigate mineral forms goniometers and microscopes are needed. A goniometer is an instrument for measuring the angles which mineral faces make with each other. For large crystals a contact goniometer is used. It consists of a graduated semicircle, to the center of whose diameter is pivoted an arm. The diameter is placed on one face of the crystal and the movable arm on the other, while the angle between the two faces to be measured is read on the circle. Very small crystals cannot be measured in this manner, hence recourse must be had to a reflecting goniometer, an instrument so constructed that a ray of light is allowed to fall upon one face at a time. The axis to which the crystal is fastened is turned till the light is reflected from the next face. Then the number of degrees between the two positions is read on the graduated disc to which the axis is attached and the supplementary angle thus obtained. Crystals which are too small for either of these two goniometers or are embedded in other material, may be studied by first gluing them to some kind of a handle, grinding them to a plane surface on one side, cementing the ground side to a glass slide and then grinding down the other side till the section is as thin as tissue paper and permits light to pass through readily. They may then be ex-

amined under a petrographical microscope. This method permits of accurate measurements.

The study of mineral forms constitutes the subject matter of *crystallography*. As a result of the careful work which has occupied crystallographers ever since the days of the Abbé Haüy (1801) it has become known that all minerals which have crystallized under favorable conditions show forms which are comprised in six groups. More groups are not possible, less would not be all inclusive. These groups or *systems* are the Regular, Tetragonal, Hexagonal, Orthorhombic, Monoclinic and Triclinic systems. In the Regular system are embraced all forms which are constructed on three axes of equal length and which form right angles with each other. In the Tetragonal system occur the forms two of whose axes are equal while the third is greater or less than the other two. All are at right angles. The Hexagonal system is characterized by three horizontal axes equal in length, making angles of 60° with each other, but at right angles to the vertical axis, which in turn may be longer or shorter than the horizontal axes. The Orthorhombic system has three axes at right angles to each other, but all of different length. In the Monoclinic system one axis, the *a* axis, inclines forward, thus making an obtuse angle in the upper front quarter with the *c* axis. Finally, in the Triclinic system, both lateral axes, *a* and *b*, are inclined to the vertical *c*, forming angles none of which are right angles.

The Triclinic system is the least symmetrical, having neither axes nor planes of symmetry, but a center of symmetry only. The Monoclinic system possesses one axis of twofold symmetry, one symmetry plane, and a center of symmetry. The Orthorhombic system has an axis of twofold symmetry, which is formed by the intersection of two planes of symmetry or is perpendicular to two axes of symmetry. In the Hexagonal system there is an axis of threefold or of sixfold symmetry, besides four planes and a center of symmetry. Crystals in the Tetragonal system possess one axis of fourfold symmetry and there may be five planes of symmetry besides a center of symmetry. Finally, the Regular system has the greatest degree of symmetry possible, possessing four axes of threefold symmetry and sometimes nine planes of symmetry.

In the measurement of crystals and in their representation and discussion mathematical terms and principles are so brought into requisition as often to obscure the fact that not mathematics, but the physical condition of the mineral world is the subject of study. The science of mineralogy simply embodies and elucidates these principles. In minerals of the highest symmetry (Regular system) there are three directions at right angles to each other in which light or heat or electricity travel with equal ease and rapidity. When acted upon by corrosive

solutions the mineral is dissolved with equal rapidity in all three directions.

Minerals crystallizing in the Tetragonal and Hexagonal systems on the other hand respond to physical and chemical forces more rapidly or more slowly parallel to the vertical axis (*c*) than they do parallel to the other lateral axes. And the minerals characterized by Orthorhombic, Monoclinic, or Triclinic crystallization have three directions in which they respond to external influences with different speed and different results.

The laws of crystallization are just as inevitable and inexorable as the laws of gravitation. They rule all inorganic substances in the world and in all other heavenly bodies as far as we know.

Under unfavorable conditions minerals may fail to develop their characteristic crystallization and are said to be *amorphous*. For example, at ordinary temperatures water, mercury and some other substances do not crystallize. But at 32° F. water crystallizes into hexagonal crystals and at 40° below zero mercury crystallizes into regular crystals.

Crystallography is one of the readiest means of identification and an important factor in the classification of minerals. But the fundamental basis for the chief divisions of the mineral kingdom is chemical. Minerals are placed in one of seven classes, according as they are composed of one simple individual chemical substance (Class I., Elements), or result from the union of some chemical base with sulphur (Class II., Sulphides), or the union of two bases with sulphur (Class III., Sulphosalts), or the union of a base with a halogen (Class IV., Haloids), or the union of a base with oxygen (Class V., Oxides), or the union of a base with oxygen and another acidic element (Class VI., Oxygen Salts), or the union of carbon and hydrogen (Class VII., Hydro-Carbons). Within these classes the grouping is in accordance with the more minute chemical subdivisions and in accordance with their crystallography.

More than one thousand mineral species are known, but of them less than one hundred are common enough to be abundantly met with. And a student who becomes acquainted with the smaller number may have a fair conception of the inorganic world, inasmuch as this number exhibit all the chemical and physical laws, methods of studying minerals, and their relation to the economy of the universe and to mankind.

Among the elements, diamonds, graphite, sulphur, antimony, bismuth, gold, silver, copper, mercury, iron, and platinum are well known. The most noteworthy sulphids (Class II.) are stibnite, molybdenite, galena, argentite, chalcocite, sphalerite, cinnabar, chalcopyrite, pyrite, marcasite, arsenopyrite—minerals which are useful as the source of antimony, molybdenum, lead, silver, copper, zinc, quicksilver, sulphur, and arsenic. The sulpho-salts

(Class III.) are of slight importance, but the haloids (Class IV.) include some minerals which are indispensable to mankind. For example, halite, common salt, has the distinction of being the mineral which is most largely used as food by men. Fluorite is useful as a flux in iron manufacture, is the source of hydrofluoric acid, and is necessary in the making of enamel glass. For a long period cryolite was the chief source of aluminum, though now beauxite is most largely used for that purpose. Among oxides (Class V.) quartz holds a chief place, since it is the most abundant mineral in the world. It is the chief constituent of sand, sandstone, quartzite, and many igneous and metamorphic rocks. It is found everywhere. In its common forms it is useful in building and the manufactures, and in its more beautiful forms it is used as an ornamental stone. Cuprite, zincite, corundum, hematite, magnetite, chromite, cassiterite, rutile, pyrolusite, manganite, limonite, are all important minerals, since they are available sources of copper, zinc, ruby, iron, chromium, tin, titanium, and manganese. Oxygen salts (Class VI.) is by far the largest of all the classes, since it embraces salts of ten groups of oxygen acids known as the carbonates, silicates, nitrates, phosphates, niobates, sulphates, tellurates, chromates, molybdates, and uranates. Among the carbonates are calcite and dolomite, which, taken together, are the third in abundance in the world. As limestones of greater or less purity they form widespreading rock masses. Magnesite, rhodochrosite, siderite, aragonite, witherite, strontianite, cerussite, malachite, are important because of their abundance, beauty, and utility. The silicates are the most numerous of any of the oxygen salts or of any other classes for that matter. They include more than two hundred species. While the oxides have the mineral (quartz) most abundant in the world, and the carbonates the mineral (calcite) third in abundance, the silicates have the mineral (feldspar), which is second in abundance. The feldspars are mountain builders, being the chief constituents of the igneous rocks. Their decomposition furnishes soils valuable for agricultural purposes, and clays used in the manufacture of brick, tile, porcelain, etc. Other silicates important as rock formers are olivene, pyroxene, amphibole, talc, serpentine, topaz, sodalite, mica, epidote, and garnet. Among phosphates apatite is the most noteworthy, because of the size and perfection of its crystals and because of its value as a fertilizer. Several sulphates are useful, notably, baryte, celestite, anglesite, and gypsum: the first three furnishing barium, strontium, and lead, and the last being the source of plaster of paris.

The characteristics of all of these minerals, as well as of others that are rarer, are thoroughly described in such books as Mier's or Dana's mineralogies.

The chemical investigation of minerals is carried on by means of acids, alkalies, and heat. The minerals are usually pulverized as finely as possible, first in a 'diamond mortar' (a two inch piece of hardened steel, in the centre of which is a half inch deep cavity to serve as a mortar for a steel pestle), and then in an agate mortar. Then the minerals are dissolved in various reagents until their different constituents are obtained. To hasten the action of the solvents the minerals are often held on a platinum support in a Bunsen or blowpipe flame after having been mixed with some advantageous flux. When metals are sought charcoal slabs are useful supports. Minerals differ greatly in the ease with which they melt. A scale of fusibility is formed by the following seven minerals: No. 1—A small splinter of stibnite melts when held in a candle flame. No. 2—Natrolite requires a little hotter flame to melt it into a globule. No. 3—Almadine garnet in the blowpipe flame rounds into a globule. No. 4—Actinolite in such a flame rounds only on the edges. No. 5—Orthoclase requires a still longer heating. No. 6—Bronzite in the thinnest splinters shows traces only. No. 7—Quartz is quite infusible.

The colors given off by minerals held in the Bunsen flame are very characteristic of certain of them.

Some minerals heated in a glass tube deposit their volatile constituents on the cold part of the tube. Many oxidize when heated in an open tube. Many are reduced on charcoal and deposit oxidizable portions as rings. For detection of these rings aluminum or gypsum supports are useful. Borax and microcosmic beads and treatment with cobalt nitrate aid in the detection of various constituents. These methods, which constitute the department of blowpipe analysis and are set forth at length in such a book as Brush's Blowpipe Analysis, are the simplest and most expeditious means of mineral investigation.

Bibliography.—For Crystallography and Physical Mineralogy: Dana, *Text Book of Mineralogy;* Williams, *Elements of Crystallography;* Moses, *The Characters of Crystals.* More elementary works are: Dana, *Minerals, and How to Study Them;* Ballard, *The World of Matter;* Crosby, *Common Minerals and Rocks;* English, *Recreations in Elementary Mineralogy.* For optical mineralogy: Rosenbusch-Iddings, *Microscopical Physiography of the Rock-Making Minerals;* Luquer, *Minerals in Rock Sections.* For determinative mineralogy: Brush-Penfield, *Determinative Mineralogy and Blowpipe Analysis;* Endlich, *Manual of Qualitative Blowpipe Analysis and Determinative Mineralogy;* Crosby, *Tables for the Determination of Common Minerals;* Frazer, *Tables for the Determination of Minerals by Physical Properties.* For descriptive mineralogy: Dana, *System of Mineralogy;* Hintze, *Handbuch der Mineralogie.*

MINERAL WATERS, NATURAL: usual term for all spring waters which possess qualities in relation to the animal body different from those of ordinary water (which itself also is ranked in the mineral kingdom). Artificial M. W., usually imitations of some natural waters, are very largely manufactured, and are of service in some cases; but in curative effect they are not to be compared with the natural product: see AERATED WATERS. M. W. have been used as remedial agents from a very early period. The oldest Greek physicians had great faith in their curative power, and the temples erected to Æsculapius were usually in close proximity to mineral springs; they had recourse to the sulphurous thermal springs of Tiberias (now Tabareah), still used by patients from all parts of Syria in cases of painful tumor, rheumatism, gout, palsy, etc.; and to the warm baths of Calirrhoe, near the Dead Sea, mentioned by Josephus as tried by Herod in his sickness. We are indebted to the Romans for the discovery not only of the mineral thermic springs in Italy, but of some of the most important in other parts of Europe, e. g., Aix-la-Chapelle, Baden-Baden, Bath, Spa in Belgium, and many others; and Pliny, in his *Natural History*, mentions a very large number of mineral springs in almost all parts of Europe.

The therapeutic action of M. W., or of spas, as they are frequently termed, depends chiefly on their chemical composition and their temperature, though a variety of other circumstances, as situation, elevation, climate, geological formation, mean temperature, etc., have important bearing on the success of the treatment.

The best time for undergoing a course of M. W. is, in n. temperate regions, in the majority of cases, during June, July, August, and September. There are, however, exceptions depending on climate; e.g., at Gastein (q.v.), famed for thermal springs, the weather is changeable and stormy in June and July, but pleasant in May, August, and September. Early rising is usually advisable during a course of M. W., and, as a general rule, the water should be drunk before breakfast, at intervals of about a quarter of an hour between each tumbler, moderate exercise being taken in the intervals. In many cases, bathing is of even greater importance as a remedial agent than drinking. Baths are taken usually between breakfast and dinner; and should never be taken soon after a full meal. The time during which the patient should remain in the bath varies much at different spas, and the directions of the local physician should be strictly attended to on this point. It is impossible to determine beforehand how long a course of M. W. should be continued, as this entirely depends on the symptoms observed during treatment; but as a general rule, the treatment should not be protracted beyond six weeks or two months, and in some cases this is too long; but on this point the patient must be guided by the physician resident at the spa, or by one who knows both the water and the patient. Indulgence in the pleasures of the table,

and excesses of any kind, frequently counteract all salutary effects of the waters, while perfect mental relaxation is an important auxiliary to the treatment. Spas are suitable remedies for only *chronic* disorders; though among such disorders are to be ranked weariness and languor from over-work, mental or bodily, not as yet developed into marked symptoms of any disease.

No classification of M. W. based on their chemical composition can be strictly exact, because many springs are intermediate between well characterized groups. The following classification, adopted by Dr. Althaus, *Spas of Europe* (Lond. 1862), is perhaps the most convenient: 1. Alkaline Waters; 2. Bitter Waters; 3. Muriated Waters; 4. Earthy Waters; 5. Indifferent Thermal Waters; 6. Chalybeates; 7. Sulphurous Waters.

1. The Alkaline Waters are divisible into: (*a*) *Simple Alkaline Acidulous Waters*, of which the chief contents are carbonic acid and bicarbonate of soda. The most important European spas of this class are the thermal springs of Vichy and the cold springs of Fachingen, Geilnau, and Bilin (q.v.). These waters are useful in certain forms of indigestion, in jaundice from catarrh of the hepatic ducts, in gall-stones, in renal calculi and gravel, in gout, in chronic catarrh of the respiratory organs, and in abdominal plethora. Vichy (q.v.) may be taken as representative of this class of springs. (*b*) *Muriated Alkaline Acidulous Waters*, which differ from the preceding sub-group in additionally containing considerable chloride of sodium. The most important spas of this kind in Europe are the thermal springs of Ems (q.v.), and the cold springs of Selters (q.v.), Luhatschowitz, and Salzbrunn (q.v.). They are useful in chronic catarrhal affections of the bronchial tubes, the stomach, and the intestines, and the larynx; and the Ems waters have high repute in certain chronic diseases of the womb and adjacent organs. (*c*) *Alkaline Saline Waters*, of which the chief contents are sulphate and bicarbonate of soda. The most frequented are the warm springs of Carlsbad (q.v.) and the cold springs of Marienbad (q.v.). Patients suffering from abdominal plethora are those most frequently sent to these spas, which often prove of great service, if the stagnation of the blood is owing to habitual constipation, pressure from accumulated fæces, or congestion of the liver, unconnected with diseases of the heart or lungs. These waters, especially those of Carlsbad, afford an excellent remedy for the habitual constipation frequently arising from sedentary occupations; the result being much more permanent than that produced by strong purgative waters.

2. The chief contents of the Bitter Waters are the sulphates of magnesia and soda; and the best known spas of this class are those of Püllna, Saidschütz, Sedlitz, Friedrichshall, and Kissingen (q.v.); though there are two English spas—the bitter water of Cherry Rock, near Kingswood, in Gloucestershire, and the Purton Spa, near Swindon, in Wiltshire—which 'are, by their chem-

ical composition, admirably suited for the treatment of many cases of disease, and may perhaps even prove superior to the continental spas of this class.'—Althaus, *Spas of Europe*, 360. These waters act both as purgatives and diuretics, and may therefore be used advantageously in the numerous cases in which it is advisable to excite the action both of the bowels and of the kidneys.

3. The Muriated Waters are divisible into: (*a*) *Simple Muriated Waters*, of which the chief contents are a moderate quantity of chloride of sodium or common salt. The chief spas of this class are Wiesbaden (q.v.) and Baden-Baden (q.v.), which are hot; those of Soden (in Nassau), of Mondorf (near Luxembourg), and of Canstatt (near Stuttgart), which are tepid; and those of Kissingen (q.v.), Homburg (q.v.), and Cheltenham (q.v.), which are cold. The muriated saline springs of Saratoga, N. Y., are some of them chalybeate, others sulphurous or iodinous; all being rich in carbonic acid gas: they are used chiefly in cases of gout, rheumatism, scrofula, and abdominal plethora. (*b*) *Muriated Lithia Waters*, of which the chief contents are the chlorides of sodium and lithium. In gout, they first aggravate the pain, but then give relief; and in periodic headache, they have been found serviceable. (*c*) *Brines*, whose chief contents are a large amount of chloride of sodium or common salt. Among the spas of this kind in Europe, those of Rehme in Westphalia, and Nauheim in Hesse, have the greatest reputation. They are employed mostly for bathing, and are often of much service in scrofula, anæmia, rheumatism, certain forms of paralysis, and catarrh of the mucous membranes. (*d*) *Iodo-bromated Muriated Waters*, in which, besides a moderate quantity of chloride of sodium, the iodides and bromides of sodium and magnesium are contained in an appreciable quantity. Kreuznach (q.v.) is the most celebrated of this class. Its waters are used both for drinking and for bathing, and are of service in scrofulous infiltrations of the glands, in scrofulous ulcers, in chronic inflammation of the uterus and ovaries, etc. The waters of Hall, in Austria Proper, also are of this class, and have high reputation in cases of bronchocele or goitre.

4. Earthy Waters, of which the chief contents are sulphate and carbonate of lime. The most important European waters of this class occur at Wildungen, Leuk (q.v.), Bath, Eng. (q.v.), Lucca (q.v.), and Pisa (q.v.). The Wildungen water, exported in large quantities, is, according to Dr. Althaus, 'a capital diuretic, and not only promotes the elimination of gravel and renal calculi, but by its tonic action on the mucous membrane of the urinary passages, serves to prevent the formation of fresh concretions. It is also much used for chronic catarrh of the bladder, neuralgia of the urethra and neck of the bladder, dysuria, and incontinence of urine.' The baths of Leuk, in which many patients remain nine hours daily (4 A.M. to 10 A.M., and 2 P.M. to 5 P.M.),

until an eruption appears, are used chiefly in chronic skin diseases. The waters of Bath, Pisa, and Lucca, which are thermal, are useful in chronic skin diseases, scrofula, gout, rheumatism, etc.

5. Indifferent Thermal Waters, which usually contain a small amount of saline constituents. Of the spas of this class, the most important in Europe are Gastein (q.v.) (95° to 118°) Töplitz (q.v.) (120°) Wildbad (q.v.) (96°), Warmbrunn (100°), Clifton (86°), and Buxton (q.v.) (82°). Their most striking effects are to stimulate the skin and excite the nervous system. 'They are used especially in chronic rheumatism and atonic gout; in diseases of the skin, such as prurigo, psoriasis, lichen; in neuralgia and paralysis due to rheumatic and gouty exudations, to parturition, or to severe diseases, such as typhoid fever and diphtheria; in hysteria; and in general weakness and marasmus.'—Althaus, *Spas of Europe*, 421.

6. Chalybeate Waters, divisible into: (*a*) *Simple Acidulous Chalybeates*, whose chief contents are carbonic acid and bicarbonate of protoxide of iron; and (*b*) *Saline Acidulous Chalybeates*, whose chief contents are sulphate of soda and bicarbonate of protoxide of iron. For these, see CHALYBEATE WATERS.

7. Sulphurous Waters, which contain sulphuretted hydrogen or metallic sulphides (sulphurets), or both. The most important sulphurous thermals of Europe are those of Aix-la-Chapelle (q.v.), Baden (near Vienna), Barèges (q.v.), Eaux-Chaudes, and Bagnères de Luchon; while among the cold sulphurous springs, those of Nenndorf (in Hessen-Nassau) and Harrogate (q.v.) are of great importance. They are extensively used in chronic diseases of the skin, and are of service in many cases in which exudations require to be absorbed, as in swellings of the joints, in old gunshot-wounds, and in chronic gout and rheumatism. In chronic laryngeal and bronchial catarrh they frequently give relief, and in chronic poisoning by lead or mercury they favor the elimination of the poison, though to a far less degree than iodide of potassium taken internally. The sulphurous waters are employed externally and internally, and mineral mud-baths are believed by many physicians to form a valuable auxiliary to this treatment.

For further information on this subject, see Althaus; the *Dictionnaire Général des Eaux Minérales et d'Hydrologie Médicale*, by Durand-Fardel, Le Bret, and Lefort; and the very valuable work on the *Mineral Waters of Europe*, by Fichbourne and Prosser James (1883).

The chief simple alkaline springs of the United States are, the Bladon, Ala.; the Cal. Seltzer, Cal.; the Perry and Versailles, Ill.; the St. Louis, Mich.; the Sheldon (including Missisquoi), and the Weldon, Vt.; and the Des Chutes hot (143° to 145°), Oregon.

Of alkaline saline springs examples in the United States are, the Lansing well, Mich.; the Ballston spa, Saratoga co., N. Y., and the Albany artesian well, N. Y.; Milhoit's soda, Or.; and for thermal. the Idaho hot (85°

to 115°), Colo.; and the Charleston artesian well (87°, 1,250 ft. deep), South Carolina.

Of purgative or bitter water springs in the United States there may be noted, the Crab Orchard, Ky., from which the Crab Orchard salts are made; the Estill or Irvine, Ky., the water of which is strongly charged with sulphate of magnesia: and the Harrodsburg, Ky., in the water of which the laxative effect is qualified by equal amounts of sulphate of lime and of carbonate of iron. The Bedford springs, Penn., are purgative-chalybeate.

The muriated class of waters is represented especially by the springs at Saratoga. These waters are charged with carbonic acid gas, together with bicarbonates of lime, magnesia, and iron, which result from the solvent power of the acid gas upon limestone and some other rocks. Hathorn is the strongest of the Saratoga waters. The Seltzer has the mild quality desirable for use with wines. The Congress is valuable as containing in the best proportions the substances which give both agreeable flavor and satisfactory medicinal effect. The Ballston Artesian Lithia spring furnishes the most concentrated water yet obtained in this country. All the Saratoga waters contain more or less bicarbonate of iron, and are thus chalybeate, though this character is masked by the greater amount of other mineral constituents. Springs allied to the Saratoga are, the Santa Clara Congress, Cal.; the Rockbridge Baths, Va.; the Capon Bath, W. Va.; the Artesian well, St. Louis, Mo. (2,199 ft. deep); the Spring Lake and Fruit Port wells, Mich., resembling very much the Creuznach, Prussia; and the St. Catherine's, Canada, the waters of which are similar but stronger.

Springs characterized by the presence of free mineral acids, as sulphuric or hydrochloric, are found in the United States and in S. America. The Rio Vinagre proceeds from such springs, and its waters carry off daily no less than about 70,000 lbs. of concentrated muriatic acid, and over 80,000 lbs. of oil of vitriol. The Oak Orchard acid spring in N. Y. is noted for the same sort of water.

Of calcic or earthy springs, examples in the United States are (1) thermal, the San Bernardino (100° to 175°), Cal.; the Agua Caliente (130°), N. Mex.; the Sweet and the Berkeley (both 74°), W. Va.; the Warm springs (97° to 102°), N. Car.; and the Bethesda, Wis.; (2), cold, the Butterworth, and the Leslie, Eaton Rapids, and Hubbardston wells, Mich.; the Yellow springs, O.; and the Gettysburg, Penn.

In the class of indifferent thermal, the noted United States waters are those of the Hot springs (57 of them, 93° to 150°), Ark.; the Healing, the Holston, and the Hot springs (the latter 102° to 108°), Va.; the Shasta co. Tuscan, Cal.; and the Lebanon, N. Y.

The chalybeate springs, characterized by bicarbonate of iron, or in the poorer waters by the sulphate, are represented in the United States by the Schooley's Mt.,

New Jersey; Fry's soda, California; the Stafford, Connecticut; the Greencastle, Indiana; the Catoosa, Georgia; the Schuyler county, Illinois; the Owasco, Michigan; Cooper's well, Mississippi; the Beersheba, Tennessee; the Rawley, Virginia; and the Bayley, Alabama. There are grouped with these the alum waters, found in the Rockbridge, the Pulaski, the Bath, the Stribbling, the Church Hill, the Bedford, and the Variety—all in Virginia, and the Oak Orchard acid, New York.

The United States have numerous examples of sulphur waters, as the White, Red, and Salt Sulphur springs of Virginia; the White Sulphur springs of Ohio; and the Richfield, Sharon, Chittenango, and Florida springs of New York.

Silicious waters, especially those of hot springs with a large charge of silica, are represented by the famous geyser in Iceland, by the geysers of California, and by the still more famous hot springs of the Yellowstone Park, where hundreds are found, one of them throwing, in outbursts about 32 hours apart, a column of hot water 8 ft. in diameter and 200 ft. high.

Saline waters, in the form of the brines from which salt is made, occur most abundantly in Michigan and New York; also in West Virginia, Ohio, and Kansas. The brine at Syracuse, N. Y., is pumped up from wells 400 to 500 ft. deep. A peculiar type of mineral water is found where a heavy charge of biborate of soda, or borax, is present. Lakes of great size have been found in California, the water of which is very rich in borax, apparently supplied to them by hot springs.

There are numerous other springs, not strongly marked in a chemical analysis, but found practically valuable, and therefore favorite with the public: a specimen of these is the Poland spring, Maine.

MINERAL WELLS: Texas, situated at the foot of the Palo Pinto Mountains in Palo Pinto county, is noted throughout the Southwest as a health and pleasure resort. It is on the Weatherford, Mineral Wells & Northwestern railroad, has an elevation of about 1,200 feet, with an average temperature in the winter of 45° F. and in the summer of 85° F. The surrounding country is of rich sandy soil, partly mountainous and especially adapted to the raising of corn, cotton, wheat, fruit and vegetables. In 1880, J. S. Lynch, whose family had been in bad health in other sections, located on the present site of Mineral Wells. There being no water convenient a well was bored and though the water had a peculiar taste it was used exclusively. A rapid improvement in the health of the Lynch family was naturally attributed to the use of the water, and others near by were attracted, and still other cures were effected. Thus began the life of a resort which is visited annually by from 100,000 to 200,000 health and pleasure seekers and which, according to government reports, is the leading mineral water ship-

ping point of the United States. These waters are pumped from about 15 different wells of a depth of 130 feet, and vary in strength and character from the mildly laxative to the strongly alkaline, purgative and diuretic. The chief ingredients are sulphate, carbonate, and chloride of sodium, calcium carbonate, magnesium carbonate, and iron.

The principal applications of these waters is in diseases of the stomach and liver, Bright's disease, diabetes, constipation, rheumatism, insomnia, nervousness, and uric acid disturbances.

MINERAL WOOL: a product of molten slag, or rock under air or steam-jet, also called slag wool, rock wool, silicate cotton, cotton fibre. The result of this process is a thin vitreous fibre, useful as a non-conductor. It was first manufactured in Germany in the early 70's. In 1875, a little was made at the Greenwood iron furnace, Orange county, N. Y.; the industry was firmly established by 1885; then because of the entry into the field of rock wool, that is, a fibre made directly from the rocks and not from slag, the slag wool industry fell off. The slag wools have a small percentage of sulphur, unless especially desulphurized after the slag has been re-melted, and thus sulphuric acid may be formed if water gets access to the wool and acts on the calcium sulphide in it. The sulphuric acid thus formed is injurious to the pipes. Hence rock wool is substituted for slag wool, or the slag wool is carefully desulphurized. Mineral wool of either sort, if of good grade, is one of the best practical non-inflammable coatings; as a lining for floors it has the double advantage of being sound-proof and non-conducting.

MINE RUN, CAMPAIGN OF: on Nov. 7 and 8, 1863, Gen. Meade crossed the Rappahannock at Kelley's Ford and Rappahannock Station and concentrated his army of 70,000 men in the vicinity of Brandy Station, Gen. Lee, with 50,000 men, withdrawing beyond the Rapidan to an intrenched line, the left of which covered some of the fords of the river, the right being perpendicular to it and extending to Bartlett's Mill on Mine Run. On Nov. 26, Meade began the Mine Run campaign by sending the First, Fifth, and Second corps to cross the Rapidan at Culpeper Mine and Germanna fords, and the Third and Sixth corps to cross at Jacob's Mill, all five corps to converge upon the old turnpike and the plank-road near Robertson's Tavern, both leading to Orange Court House, and turn the right of Lee's position. The Second corps reached Robertson's Tavern at 10 A.M. of the 27th to find itself in the presence of a considerable body of Ewell's corps which Lee had hastened there, and it was ordered to remain on the defensive, until the Third corps, followed by the Sixth, came up on the right. But the Third corps was delayed. Lee, on discovering Meade's movement, had promptly ordered Early, commanding

Ewell's corps, to move to the right. Part of his command had reached Robertson's Tavern and confronted the Second corps, and Johnson's division was moving in the same direction when it came into collision with the Third corps, on Payne's Farm, and a battle ensued, lasting until dark. The Union loss was 125 killed, 747 wounded, and 71 missing. Lee reported a Confederate loss of 545. The Second corps was severely engaged during the day, and advanced some distance beyond Robertson's Tavern. At night the First corps moved up to the support of the Second. The Fifth corps, which had supported Gregg's cavalry division in an engagement at Parker's store, on the Orange plank-road, was brought over to support the Second, and next morning the Third and Sixth corps came up on the right of the Second. On the 28th, Meade advanced to the attack, but on driving in the Confederate pickets it was found that Ewell's corps had fallen back. Pursuit was made, the Second corps in advance, and after a march of two miles Ewell was found in position on the west side of Mine Run. A. P. Hill had come up and formed on Ewell's right, covering the Orange plank-road. The line was very strong, and on it were 150 guns. It was after dark when the Second, Sixth, and First corps, with part of the Third, fronted this position. An examination of Lee's position convinced Meade that there was no probability of success in an attack in his immediate front, and he determined to send Gen. Warren, with his Second corps and a division of the Sixth, to feel for Lee's right flank and turn it if practicable. The 29th was spent in reconnoitering and demonstrations, while waiting for Warren's movement. Early in the morning of the 29th, Warren started from Robertson's Tavern, crossed over to the plank-road, drove in the skirmishers of A. P. Hill's corps, and late in the day came upon Hill's position across the road. Warren reported to Meade that the conditions were favorable for an attack, and personally assured him that he could carry everything before him. Meanwhile some of Sedgwick's division commanders had discovered weak points on Lee's left, no works being thrown up, and Meade ordered an attack for the morning of the 30th, the right and centre to open with artillery at 8 o'clock, at which time Warren was to make the main attack, and at 9 o'clock Sedgwick was to assault Lee's left with five divisions of the Fifth and Sixth corps. Two divisions of the Third corps were sent to Warren, thus increasing his command to six divisions of 26,000 men. The batteries on the right and centre opened a furious fire at 8 A.M. The skirmishers of the First and Third corps advanced across Mine Run and drove in those of the enemy, and Sedgwick was about to assault when Meade ordered him to desist. He had received a despatch from Warren advising against an attack on Lee's right, as it could not succeed. During the night of the 29th, Warren had made dispositions for an overwhelming assault, but on the morning of the 30th

he saw on the heights before him a line of strong works thrown up over night, well filled with infantry, and heavy batteries covering the slope up which it was necessary to charge, and therefore he deemed successful attack impossible. Meade rode over to Warren, who proved unchangeable in opinion, and Meade tried to arrange for an attack later in the day, but found it impracticable. The armies remained confronting each other that day and the next, and on the night of Dec. 1 Meade withdrew to his former position beyond the Rapidan. Lee followed part way on the 2d. The Union loss in the Mine Run campaign, Nov. 26 to Dec. 2, was 173 killed, 1,099 wounded, and 381 missing. The Confederate loss was 110 killed, 570 wounded, and 65 missing.

MINERSVILLE, *mī'nĕrz-vĭl:* borough, in Schuylkill co., Pa.; on the west branch of the Schuylkill river, and on the Philadelphia & Reading and Lehigh Valley railroads; about 45 m. n. by e. of Harrisburg. It is situated in the hard coal region, and its chief industries are connected with mining and shipping coal. Some of its industrial establishments are machine shops, foundries, lumber and brick yards. Pop. (1900) 4,815.

MINERS, WESTERN FEDERATION OF: an organization including all workers in and around mines, mills, and smelters, for the improvement of their industrial and social condition. The Federation opposes the truck system, child labor, contract labor, and the use of the injunction in strikes. The executive officers are a president, a treasurer, and a secretary; there is also an organizer for each district; and these officers constitute the executive board. The executive board must approve every strike before it receives the support of the union. Its official organ is the *Miners' Magazine.* It was organized in 1893, and took the lead in the organization of the American Labor Union, with which it is now affiliated.

MINERVA, n. *mĭn-ĕr'va* [L. *Minerva*—from L. root *men;* Skr. *man,* to think]: in Roman mythology, goddess of wisdom; identified by the later Græcizing Romans with the Greek *Athene,* whom she greatly resembled, though, like all the old Latin divinities, which were abstractions, there was nothing anthropomorphic in what was told concerning her. The ancient Latin scholar and critic, Varro, regarded Minerva as the impersonation of divine thought—the plan of the material universe of which Jupiter was creator, and Juno representative: in this view, all that goes on among men, all that constitutes the development of human destiny (which is but the expression of the divine idea or intention), would be under her care. She was the patroness of arts, sciences, handicrafts, and inventions; and was invoked alike by poets, painters, teachers, physicians, and all kinds of craftsmen. She also guides heroes in war; and wise, bold and useful designs were ascribed to the inspiration of this virgin goddess.

Her oldest temple at Rome was that on the Capitol, but she had another on the Aventine. Her festival was in March, five days, 19th to 23d inclusive.

ATHENE, or PALLAS ATHENE, the Greek goddess corresponding to the Roman Minerva, was one of the few really grand *ethical* divinities of Greek mythology. Different accounts are given of her origin and parentage, probably from the jumbling together of local legends; but the best known, and in ancient times, the most orthodox version of the myth represented her as daughter of Zeus and Metis. Zeus, we are told, when he had attained supreme power after his victory over the Titans, chose for his first wife Metis (Wisdom); but being advised by both Uranus and Gæa (Heaven and Earth), he swallowed her when she was pregnant with Athene. When the time came that Athene should have been born, Zeus felt great pains in his head, and caused Hephæstus (Vulcan) to split it up with an axe, when the goddess sprang forth—fully armed, according to the later stories. Throwing aside the thick veil of anthropomorphism which conceals the significance of the Grecian myth, we may see in this account of Athene's parentage an effort to set forth a divine symbol of the combination of power and wisdom. Her father was the greatest, her mother the wisest of the gods. She is literally born of both, and so their qualities harmoniously blend in her. It is possible that the constant representation of her as a strictly maiden goddess, who had a *real*, and not merely a *prudish* antipathy to marriage, was meant to indicate that qualities like hers could not be mated, and that, because she was perfect, she was doomed to virginity. She was not, however, a cold, unfeeling divinity; on the contrary, she warmly and actively interested herself in the affairs of both gods and men. She sat at the right hand of Zeus, assisting him with her counsels; she helped him in his wars, and conquered Pallas and Encelados in the battles of the giants. She was the patroness of agriculture, invented the plow and rake, introduced the olive into Attica, and (in harmony with her character as the personification of active wisdom) taught men the use of almost all the implements of industry and art; and is said to have devised nearly all feminine employments. Philosophy, poetry, and oratory also were under her care. She was the protectress of the Athenian state, was believed to have instituted the court of justice on Mars' Hill (the Areiopagus). As a warlike divinity, she was thought to approve of those wars only which were undertaken for the public good, and conducted with prudence; and thus she was regarded as the protectress in battle of those heroes who were distinguished as well for wisdom as valor. In the Trojan wars, she favored the Greeks—who, in fact, were in the right. Her worship was universal in Greece, and representations of her in statues, busts, coins, reliefs, and vase-paintings were and are numerous. She is always clad, generally in a Spartan tunic, with a cloak over it,

and wears a helmet, beautifully adorned with figures of different animals, the ægis, the round Argolic shield, a lance, etc. Her countenance is beautiful, earnest, and thoughtful, and the whole figure majestic.

MINERVA-PRESS, n. *mĭn-ĕr'va-prĕs:* in *bibliog.*, name of a printing-press formerly in London; also a series of ultra-sentimental novels issued from this press at the close of the 18th and the beginning of the 19th century.

MINERVINO, *mē-nĕr-vē'nō:* town of s. Italy, province of Bari, called the *Balcony of Puglia*, from the extensive view it commands of several cities. It stands on a fine hill, and has excellent air. Pop. (1881) 15,163.

MINES, in Law: mineral deposits as affected by governmental provisions as to ownership, claims, etc. In England the crown has the right to all M. of gold and silver; but where these metals are found in M. of tin, copper, iron, or other base metal, then the crown has the right to take the ore only at a price fixed by statute. As a general rule, whoever is owner of freehold land, has a right to all the M. underneath the surface, for his absolute ownership extends to the centre of the earth. When the land is given by will or otherwise to a tenant for life, while a third party has the reversion, then the tenant for life is held not entitled to open M. which have never before been opened, but he may carry on such as have been open. So in lease of lands for agricultural purposes, if nothing is said as to M., the tenant is not entitled to open any M., for that would be committing waste. It is not uncommon for one person to be owner of the surface of the land, and another to be owner of the M. beneath; or several persons may be owners of different kinds of M. lying above each other in different strata. The courts have determined that even though the owner of the land whose surface has been sold to a railway, reserve his right to minerals, he is nevertheless prevented by common law from working the M. immediately under the railway in a manner to endanger its use.

In the United States, the royal charters to the colonies of Mass., R. I., Conn., Penn., Md., and Va., conveyed all M., but reserving to the crown one-fifth of all ores of gold and silver. The continental congress, 1785, reserved to the general govt. one-third of gold, silver, lead, and copper M.; but this regulation was not long operative. Since 1866, by law of congress, all public mineral lands are freely open to be explored and occupied, under due and necessary regulations, local or federal. A law passed 1872 covers all the important points as related to the general government; but the differing mining laws of various western states must be referred to respectively in each case of use and occupancy of mineral lands.

Recent acts of parliament insure the greater safety of persons working them, and prevent the employment of women and children. Owners of mines are prohibited

from employing any woman or boy under 10 years of age underground. Boys under 16 can be so employed only ten hours per day, and boys under 12 must attend school at certain times. No owner or worker of a mine or colliery is allowed to pay the wages of the men at any tavern, public-house, beer-shop, or place of entertainment, or any office or outhouse connected therewith. No person under 18 is to be employed at the entrance of any mine, to have charge of the steam-engine or windlass, or other machinery and tackle for letting down and bringing up the men. Inspectors are appointed by government for the express purpose of visiting mines, and seeing that the statutes are complied with.—In the United States, laws varying in details, but to the same general purport, have been enacted in the different states.

MINES, MILITARY: important department in military engineering, and formidable accessory in the attack and defense of fortresses. A military mine consists of a gallery of greater or less length, starting from some point of safety and extending under an opposing work, or under an area over which an attacking force must pass, and terminating in a chamber which, being stored with gunpowder, can be exploded at the critical moment. M. are of great use to the besiegers in the overthrow of ramparts and formation of a breach; the *countermines* of the besieged are equally serviceable in undermining the glacis over which the assaulting column must charge, and blowing them into the air, or in destroying batteries erected for breaching. But far above the actual mischief wrought by the mine—often very great—is its moral influence on the troops, especially on the assailants. The bravest soldiers, who advance without flinching to the very mouth of the cannon *which they see*, will hesitate to cross ground which they suppose to be undermined, and on which they may be dashed to destruction in a moment, without the power of averting the *unseen* danger. The first employment of M. was very ancient, and consisted merely in obtaining an entrance to the interior of towns by passing beneath the defenses; but this soon fell into disuse, the chances of success being merely those of introducing a body of men before the besieged discovered the mine. The next use occurred during the middle ages, and was more destructive. The miners went no further than beneath the wall, then diverged to either side, and undermined the wall, say for about 100 ft. During the process, the wall was sustained by timber-props; and these being ultimately set on fire, the wall fell; and the besiegers, who had awaited the opportunity, rushed in at the breach. This use of M. of *attack* necessitated those of *defense*, which obtained in mediæval times, and have ever since kept the name '*countermines*.' The earliest subterranean defense consisted of a gallery surrounding the fort in advance of the foot of the wall, and termed an 'envelope-gallery.' From this the garrison would push forward small branches or tributary galleries, whence they

could obtain warning of the approach of hostile miners, and by which also they succeeded, at times, in overthrowing the battering-rams or towers of the besiegers.

Two centuries appear to have elapsed between the introduction of gunpowder into European warfare and its application to subterranean operations. The first instance occurred 1503, at the siege of the Castello del' Uovo, in the Bay of Naples, which a French garrison had succeeded in holding for three years against the combined Spanish and Neapolitan forces. At length, a Spanish capt., Pedro Navarro, devised a gallery into the rock, which he stored with powder, whereof the explosion, hurling portions of the rock and many of the besieged into the sea, caused the immediate capture of the place. At once the use of M. of attack spread throughout Europe; and so irresistible were they soon considered, that it was not unusual for the besieger, after preparing his mine, to invite the besieged to inspect it, with the view of inducing the latter at once to surrender. Defense soon availed itself of the new power, and retaining the envelope-gallery as a base, ran small countermines in many directions, to ascertain by hearing the approach of the enemy's sappers—their work being audible, to a practiced ear, at a horizontal distance of 60 ft. Small charges were then exploded, which, without creating surface disturbance, blew in the approaching gallery, and buried the sappers in its ruins. Thus commenced a system of subterranean warfare, requiring the greatest risk and courage, in which the operator was in constant danger of being suffocated. Of course, in such a system, the balance of advantage lay with the besieged, who had ample opportunities, before the siege commenced, of completing his ramifications in every direction, and, if desirable, of revetting them with masonry, which much diminished the chance of being blown in; while the assailant, no longer able to cross the glacis by an open zigzag trench, was compelled to engage in a most uncertain subterranean advance. The French engineer Belidor, in the 18th c., restored the advantage to the attack, by demonstrating that the explosion of a very large mass of powder in a mine which had not yet entered the labyrinth of defensive M., effected the destruction of the latter for a great space round, clearing the way with certainty for the hostile advance. Besides M. for explosion, tunnels are often dug as means of communication between different works, or between different parts of the same work, some being of size sufficient to permit the passage of four men abreast, of horses, and of artillery.

M. are either vertical—when they are called *shafts*—horizontal, or inclined, in either of which cases, they are *galleries*, the word 'ascending' or 'descending' being added, if there be inclination. The dimensions range from the 'great gallery,' six ft. six inches by seven ft., to the 'small branch'—the last diminutive of the gallery—which has but two ft. six inches height, with a breadth of two ft. The most frequent work is the 'common gal-

lery,' four ft. six inches by three ft., which is considered the easiest for the miner.

The sapper's tools are numerous, but most in request are his shovel, pickaxe, and above all, his 'push-pick' (see fig. 1); he has besides a barrow, a small wagon, a lamp, and other accessories. As he advances, it is necessary to line his gallery, always at the top, and almost always at the sides. This he does either by frames—which resemble door-frames, and serve to retain horizontal planks or 'sheeting' in position against the earth—or by cases somewhat resembling packing-cases, of little depth, which are used to form the sides and top. With cases, galleries are supposed to advance one ft. and a half per hour; while with frames, the progress is barely more than half that amount.

Fig. 1.—Push-pick: Length, 1 ft. 10 in.

When a mine is exploded, the circular opening on the surface is called the *crater;* the *line of least resistance* is the perpendicular from the charge to the surface; the half-diameter of the crater is its radius; and the *radius of explosion* is a line from the charge to the edge of the crater, on the hypothenuse of the triangle, the revolution of which would form the cone. When the diameter equals the line of least resistance, the crater is called a one-lined crater; when it doubles that line, a two-lined crater; and so on. The common mine for ordinary oper-

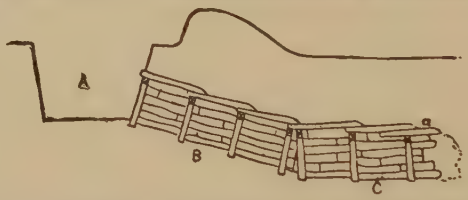


Fig. 2.—Mine supported by Frames, in process of construction from a Trench:

A, trench; B, descending gallery; C, gallery; *a*, roofing plank not yet pushed out to its full length.

ations is the two-lined crater; and for this the charge of powder should—in ground of average weight and tenacity—be in lbs. a number equal to one-tenth of the cube of the line of least resistance in ft.; e.g., at a depth of 18 ft., the charge should consist of 583 lbs. In sur-charged M., or globes of compression, as introduced by Belidor, vastly greater charges are employed, and craters of six lines are sometimes produced. The rules, in these cases, for computing the charges vary exceedingly, according to different engineers, and in every case are very complicated. Previous to the explosion, the gallery is filled up behind the charge, or *tamped*, with earth, sand-bags, etc., to prevent the force of the powder wasting itself in the mine. This tamping must extend backward for one

and a half or twice the length of the line of least resistance. The mine is fired usually by means of a powder-hose, composed of strong linen inclosed in a wooden pipe laid carefully through the tamping, or by wires from a voltaic battery.

In the annexed figure (fig. 3), is shown a system of countermines. The magistral gallery, AAA, is immediately within the wall of the counterscarp, through orifices in which it derives light and air, and by its loop-holes, the defenders can take in rear any enemy who might obtain momentary possession of the ditch. Farther in advance, and reached by galleries of communication B, is the envelope-gallery C, from which radiate the listeners D, D. To prevent the enemy's advances, these

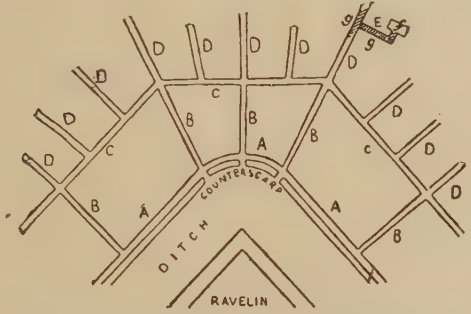


Fig. 3.—System of Countermines:

AAA, magistral gallery; BBB, galleries of communication; CCC, envelope-gallery; DDD, listeners; E, branch ending in chamber *f*.

listeners should not be more than about 54 ft. apart. Besides listening, they are used for aggressive purposes, such as driving branches and blowing in or up hostile works. Modern engineers object to the envelope-gallery, as affording too good a base to the enemy, should he obtain possession of it; and either dispense with it altogether, or merely retain it in short sections. At suitable points among the M., small magazines for tools and powder are formed; and at about every 30 yards, loop-holed doors of great strength are made, to stop the advance of an enemy, should he break into the galleries. In the course of their excavations, hostile miners frequently meet, or approach within a few feet: it becomes, then, merely a question of time which shall destroy the other; shells, pistols, pikes, and petards, as well as small mines, being used with murderous effect.

Provision is made for pumping foul air out of mines; but such military works are in general badly ventilated.

MINEVER, n. *mĭn'ē-vĕr* [OF. *menuver*, a grayish fur: F. *menu*, small; *vair*, a kind of fur]: an animal, a variety of the ermine; its fur, which, in the middle ages, lined the robes of noblemen; also said to be fur obtained from a squirrel; spelt also MENIVER and MINIVER.

MINGHETTI, *mēn-gĕt'tē,* Cavaliere MARCO: Italian writer and statesman: b. Bologna, 1818, Nov. 8; d. Rome, 1886, Dec. 10; of an opulent commercial family. Having finished his studies, he travelled, closely investigating the political, social, and economical institutions of France, Germany, and especially Britain. Returning, he published an essay advocating the free-trade views of Richard Cobden. In 1846, Minghetti opened his political career by starting a journal of liberal tendencies, soon after Pius IX. became pope; in 1847, he was elected member of the *Consulta delle Finanze,* and in 1848 became minister of public works. Having speedily lost faith in public progress under the papacy, Minghètti withdrew from office, and joined the army of Charles Albert in Lombardy, where he was appointed captain. After the battle of Goito, he was promoted major; and for his bravery at Custoza, he received from the king the cross of the Knights of St. Maurizio. After the war, Minghetti gained the confidence of Cavour, and subsequently became secretary for foreign affairs, resigning with Cavour on the peace of Villafranca. Minghetti became minister of the interior 1860, premier 1863, ambassador to London 1868, and was again premier 1873-76. His chief works are *Della Economia pubblica* (1859); *La Chiesa e lo Stato* (1878).

MINGLE, v. *mĭng'gl* [Dut. *mengelen,* to mingle—from *mengen,* to mix: Icel. *menga,* to mingle: Ger. *mengen;* AS. *mengian;* Gr. *mignuein,* to mix]: to unite into one body by mixing; to mix; to blend; to join in mutual intercourse or in society. MIN'GLING, imp. *-glĭng.* MINGLED, pp. *mĭng'gld.* MIN'GLEDLY, ad. *-gld-lē.* MIN'GLER, n. *-glĕr,* one who mingles. MINGLE-MANGLE, a medley; a hotch-potch.

MINGRELIA, *mĭn-grē'lī-a:* former principality of Transcaucasia, corresponding to anc. Colchis (q.v.); on the Black Sea. It was formerly a part of Georgia, and later was under its own princes; but since 1867 has been included in the govt. of Kutais, Russia. It is mountainous and forest-covered, with valuable mineral deposits.

MINGRELIAN, n. *mĭn-grē'lī-an:* native or inhabitant of Mingrelia. In *chh. hist.,* Greek Christians, natives of Mingrelia, a part of Old Georgia, and followers of Cyrillus and Methodius. They do not baptize their children till the 8th year, and observe other peculiarities of ritual and discipline.

MINHO, *mēn'yō* (Span. *Miño,* anc. *Minius*): river of Spain and Portugal, rising in the n.e. of Galicia, lat. about 43° 20′ n., long. about 7° 15′ w. Its course is s.w. through the modern Spanish provinces Lugo and Orense, after which it forms the n. boundary of the Portuguese province of Minho, and empties into the Atlantic Ocean. Its length, exclusive of windings, is 130 m., and it is navigable for small craft 23 m. above its mouth.

MINIATURE, n. *min'i-tūr* [F. *miniature*—from It. *miniatura*, a miniature—from L. *miniātus*, colored with *minium* or red-lead, as the ornaments of MSS.]: any minute picture; a portrait of small dimensions; a name usually applied to portraits painted on a very small scale on ivory, etc., and in water-colors; red letter: ADJ. on a very small compass; minute.

MINIATURE PAINTING: while there seems to be no reasonable doubt but that the name *miniature*, as applied to small painted portraits, is a corrupt evolution and not, as commonly stated, a derivation from the Latin *minium* or red lead, with which the initial letters of ancient manuscripts were written, miniatures, as we understand them to-day, were known centuries before the red-lead initial letter was ever used. From the simple initial letter there was developed the superb illuminated manuscripts, where the initial letters were frequently embellished with portraits, and among these, especially the religious Book of Hours, of which there are many different ones, are some of the most exquisite paintings done by the hand of man at any period in the history of art. But far back in ancient days, long before illuminated missals or red-lead initials, miniature pictures and portraits were made, but by what name they were called, if any, has not come down to us. We find them on the oldest of Egyptian papyri, made about 2000 B.C.; on Greek vases of a later period and so on without intermission down to the detached painting in little on skin, metal, paper or bone that we know as miniatures, a term that defines itself, as every one understands what one means by the simple use of the word, and it is to these latter, almost exclusively portraits, that our attention is directed.

The transition from the illuminated mediæval manuscripts on vellum to the detached portrait on the same material, then on metal plates of copper, silver and sometimes gold, followed by paper or card-board and finally ivory, the material best of all suited to the purpose, was rather more sudden than gradual, albeit the school of modern miniature painting is derived directly from the scholastic miniaturists; and Britain may lay claim to the foundation of the first and best school of miniature painting proper. As slow as she was in the development of the arts generally, she was first and foremost in this department and has always maintained her supremacy, even though it were a German who was the first English miniature painter. To Hans Holbein (1497-1543), a native of Augsburg, is due the honor of introducing the art of portrait miniature painting into England and with such success that she has since retained an almost exclusive pre-eminence in the art. To such a degree is this true that the art of portrait miniature may be considered in some ways exclusively an English art. Its greatest exponents have been Englishmen, whose works while "limned in little" bear comparison with the greatest portraits of the world. Al-

though Holbein was a foreigner he did his best work in England and of English subjects, so that he has become to be looked upon as an English artist. He visited England first in 1526 for two years, returning in 1531 and remaining until his death by the plague. It was during his second visit that he began painting miniatures on vellum in gouach, the same medium as was employed by the earlier illuminators; but his portraits were on such broad lines that they would lose nothing by being enlarged to life size. Holbein was succeeded by Nicholas Hilliard (1537-1619) who was a goldsmith and jeweller as well as miniature painter and was employed by Queen Elizabeth and James I. He was fond of detail and his work is very decorative and minute in execution. He wrote the first treatise in English on miniature painting which still remains in manuscript. He was followed by the Olivers, father and son, Isaac (1556-1617) and Peter (1601-1647), both of whose work is important artistically as well as historically, and with them the traditions of the illuminators may be said to have passed away.

Under the influence of Van Dyck was developed the greatest epoch in the art of miniature portrait painting with John Hoskins (1590-1664) and his nephew, Samuel Cooper (1609-1672), in the lead, the latter being easily first of all miniature painters of any land and of all time. He excelled his predecessors and contemporaries and has never been equalled by any miniaturist since, far less surpassed. His art contains the finest qualities possible in the miniature portrait; character, expression, breadth, vigor, and solidity, combined with masterly balance of light and shade, simplicity and dignity of color and graceful treatment. He was followed by Thomas Flatman (1637-1688), Nathaniel Dixon (1640-1690), Laurence Crosse (1650-1724), and Bernard Lens (1682-1740), artists of note in their work, with some others of less importance. The year of Lens' death or possibly the next year saw the birth of Richard Cosway, (d. 1821) undoubtedly the best known name in the whole catalogue of miniature painters and unqualifiedly a great artist, but not entitled to the supreme place in which he is most frequently figured. There are more forged miniatures after Cosway and more attributed to him that he did not paint than all other miniature painters combined.

Ozias Humphrey (1742-1810) was one of the most charming miniature painters of the 18th century, whose proper place in the history of the art is next to Cooper, because of his characterization, breadth of handling and atmospheric qualities of tone and color; John Smart (1741-1811), Samuel Shelley (1750-1808), George Englehart (1752-1839), Andrew Plimer (1763-1837), Nathaniel Plimer (1757-1822), Henry Edridge (1769-1821), Andrew Robertson (1777-1845), William John Newton (1785-1869), and William Charles Ross (1794-1860) close the school of true miniature painters and are all important names of men who were eminent in the history of English miniature painting.

Of other countries there were in France, Francois Clouet, often called Janet, (1516-1570) who painted what is claimed to be the only authentic portrait of Mary, Queen of Scots; Pierre Adolph Hall (1736-1793) who, a Swede by birth, is the greatest miniature painter of the French school; Luc Si[illegible] .46-1825), Jean Baptiste Augustin (1759-1834), Jean Guerin (1760-1836), Jean Baptiste Isabey (1767-1855), Daniel Saint (1778-1847), and the last but by no means the least L. Mansion, who published a little book on his art. In Germany, Heinrich Friedrich Fuger (1751-1818) stands almost alone as a notable painter in little. In Italy, Rosalba Carriera (1675-1757) carries the palm, while Pompeio Battoni (1708-1787) and Guiseppi Longhi (1766-1831), the latter better known as a master of engraving, were skilled in their art. But any sketch of miniature painting would be sorely incomplete without a reference to what America has done in that delightful field of art, and it is not too much to say that, next to the mother country, America has produced the best miniature painters, if true art be placed before mere mechanical dexterity of manipulation.

There were painters in little in the early colonial days whose works have survived and do them no discredit, while their names are lost. But among American miniature painters who are well known and did good work are John Singleton Copley (1735-1815), Charles Willson Peale (1741-1827), James Peale (1749-1831), Henry Bembridge (1750-1820), John Trumbull (1756-1843), who beautifully painted little portraits on wood in oil colors that are generally classed as cabinet pictures, but are as much miniatures as many painted on ivory and on paper; John Ramage (d. 1802), Robert Fulton (1765-1815), better known as an inventor than as a painter; Archibald Robertson (1765-1835), William Dunlap (1766-1839), Edward Greene Malbone (1777-1807), easily first in his art in this country and at his best the peer of any miniature painter since Cooper; Robert Field (d. 1819), Benjamin Trott (d. 1837), Charles Fraser (1782-1860), Thomas S. Cummings (1804-1894), George H. Cushman (1814-1876), and Richard M. Staigg (1817-1881), who was the last here to practice the true art of the painter in little. The camera has taken the place of the brush, and miniature painting, as practiced down to the middle of the last century, unfortunately must be relegated to the lost arts. Within the last decade or more its revival has been attempted, but the best of these revivals are no better than painted photographs, which most of them really are, or large pictures painted in small size. They absolutely lack the distinction, the feeling, the technical excellence, the color, and the atmosphere that make the true miniature so attractive, so charming, and so lovable. For miniatures in enamel, see ENAMELS.

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MINIÉ, *mĭn'e*, F. *mē-nē-ā'*, CLAUDE ÉTIENNE: soldier 1804, Feb. 12—1879, Dec. 14; b. Paris. He enlisted in the Fr. army 1821; served several campaigns in Algeria; became capt. 1849; was much engaged with study of gun and ammunition improvements, and might have lost his place in the service but for support of the Duke de Montpensier. He was a chief of battalion 1852-57. The Minié rifle-ball he invented 1849, but took no patent. It was used by the Eng. army at Inkermann, but not by the Fr. until after the Crimean war. It is a cylinder, conical in front, hollow behind, and with a slight ridge of metal, which pressure of firing forces into the grooves of the gun barrel, causing a flight of the ball of much increased range and precision. Capt. Minié came to America, 1869, to take charge of the Remington gun factory; but later accepted an appointment to take charge of a school of gunnery and manufactory of arms in Cairo, Egypt. See RIFLED ARMS.

MINIFIE, WILLIAM: 1805, Aug. 14—1880, Oct. 24; b. Devonshire, England: author. He was educated for an architect; came to the United States and opened an architectural and book-selling establishment in Baltimore 1828; was many years curator of the Maryland Acad. of Sciences, and prof. of drawing in the Maryland Institute Schools of Art; and published *Text-book of Mechanical Drawing* (1849); *Text-book of Geometrical Drawing; Perspective and Shadows* (1853); *Essay on the Theory and Application of Color* (1854); and *Popular Lectures on Drawing and Design* (1854).

MINIKIN, n. *mĭn'ĭ-kĭn* [Dut. *minnekyn*, a Cupid, dim. of *minne*, love: AS. *minicen*, a nun, a minikin—from *menen*, a damsel]: a favorite; a darling: ADJ. diminutive; small.

MINIM, n. *mĭn'ĭm* [F. *minime*, extremely small—from L. *minimum*, the least: It. *minimo*]: in *music*, a note of the value of half a semibreve: the smallest liquid measure, about equal to one drop. MINIMUM, n. *mĭn'ĭ-mŭm*, the least quantity or degree: the opposite of *maximum*; a dwarf. MINIMIZE, v. *mĭn'ĭ-mīz*, to reduce to the smallest quantity or proportion possible. MIN'IMIZING, imp. MIN'IMIZED, pp. *-īzd*.

MINIMS, *min'imz* [Lat. *Fratres Minimi*, Least Brethren, so called, in token of still greater humility, by contrast with the *Fratres Minores*, or Lesser Brethren of St. Francis of Assisi (q.v.)]: order of the Rom. Cath. Church, founded about the middle of the 15th c. by another St. Francis, native of Paula, a small town of Calabria. Francis had, as a boy, entered the Franciscan order; but the austerities of that rule failed to satisfy his ardor; and on his return from a pilgrimage to Rome and Assisi, he founded, 1453, an assoc. of Hermits of St. Francis, who lived first in separate cells, but eventually were united in the conventual life 1474, and were established in several places in Calabria and Sicily. Francis was invited into France by Louis XI., and founded houses of his order at Amboise and at Plessis-les-Tours. In Spain, the brethren took the name of 'Fathers of Victory,' in memory of the recovery of Malaga from the Moors, which was ascribed to their prayers. It was not till very near the close of the life of Francis that he drew up the rule of his order. It is exceedingly austere, the brethren being debarred the use not only of meat, but of eggs, butter, cheese, and milk. Notwithstanding its severity, this institute attained considerable success; its houses, soon after the death of Francis (1502), numbering no fewer than 450. It has reckoned several distinguished scholars among its members; but in latter times, the order has fallen into decay, being now limited to a few houses in Italy, the chief of which is at Rome. The superiors of convents in this order are called by the singular name *Corrector*, the general being styled *Generalis Corrector*. A corresponding order of women had its origin about the same time, but also has fallen into disuse.

MINING: the occupation of obtaining useful mineral substances from veins, beds, rock masses or reservoirs. Success in the work is rendered more probable by a knowledge of the character and nature of minerals, such as is set forth in mineralogy (q.v.); acquaintance with the chief facts of geology (q.v.); an understanding of economic geology; and a good foundation in the principles of chemistry, physics, and mathematics.

While the industry had a simple beginning in the remote ages when men washed gravels for gold or precious stones, it is now a well developed business calling for the investment of much capital, the use of extensive machinery, and the employment of men trained in various sciences. The geologist, assayer, civil engineer, electrical engineer, mining engineer, and metallurgist, all find in the business problems that call upon their highest knowledge and skill.

The substances most generally sought are such metals as gold, silver, platinum, copper, iron, lead, zinc, tin, quicksilver, antimony, bismuth, aluminum; and such nonmetals as coal, gas, oil, building stone, precious stones,

pigments, abrasive materials, clays and other substances used in the arts and manufactures.

One wishing to mine must first find a favorable location. While hunting, he is called a *prospector.* He may stumble upon his *prospect,* as has many a sheep herder or stage driver or 'grub-stake prospector.' He may be a rule-of-thumb man or one well educated in all the sciences involved. Of two men equally keen of sight, rugged, and persistent, the better educated will have by far the greatest chances for success, although the self-styled 'practical' man usually states otherwise. Old-timers washing for gold threw away a pile of 'troublesome blue stuff' before a mineralogist came, who recognized that the 'blue stuff' was argentite and took steps which led to the development of the fabulous wealth of the Comstock lode (Nevada). Chance figures largely in the finding of a mine; expert knowledge in its recognition.

The prospector notices the character of the rock. For example, if searching for gold, he may follow up a stream bed, from time to time putting a few shovelfuls of gravel into his pan—a sheet-iron pan about a foot and a half in diameter, about three inches deep, with flat bottom and sloping sides. Holding this pan under the water, he shakes and gently rotates it till all the gravel has run over the side, leaving any gold which may be present in the bottom of the pan. Mining alluvial gold by *panning* is possible, inasmuch as ordinary gravel has a specific gravity of about three, while gold is at least six times as heavy as the other materials in the pan (Sp. G. is 19).

While panning gives the prospector for gold good service, a progressive miner soon employs better implements. The prospector next endeavors to trace the gold up stream, and, if possible, to locate the *lode* from which it was derived. When searching across country he looks for contact of metamorphic with igneous or sedimentary rock. Outcrops of rock aid him, and when the rock is covered by surface soil the growth of certain vegetation may enable him to follow certain formations. Yucca grows best on granitic rock, while the ocotilla is confined almost exclusively to clay slates, so that it often appears as if a fence were dividing them. Elderberry bushes, whose white blossoms can be distinguished from afar, require water and hence grow on the rim of bed rock rather than on gravels. Springs, also, are a useful guide. Further, the contour of the country is to be closely observed. Quartz veins being resistant to both chemical and physical agencies often stand out above the surface, forming a wall extending for miles across the country. In Australia the miners call them reefs. A depression or trench may be formed by a vein whose chief constituent (lode stuff) is calcite, pyrite, kaolin, or another non-resistant substance. Attention is paid to the *dip, strike, faulting,* and other structural features of the rocks, as

well as to their petrographical characters. All of the precious metals are found most commonly at contact with igneous and metamorphic rocks. Non-oxidizable metals like gold and platinum, minerals like cassiterite, monazite, diamonds, rubies, zircon, and so forth, are found in gravels derived from igneous and metamorphic rocks. Platinum is found in connection with serpentine; lead and zinc, in limestones and metamorphic rocks; copper, in melaphyre, and associated with precious metals in the classes of rocks above mentioned; quicksilver, in metamorphic limestone; tin, in granite; iron, widely disseminated in all these classes of rocks.

After the presence of precious metal has been detected the next question is as to its quantity and value. Samples are taken from as wide an area as possible and under varying conditions and are assayed. In taking such samples the assayer has to guard against the deceptions of man and nature—one deception is just as much to be feared and guarded against as the other. 'Salting' a mine by would-be sellers is a common occurrence. About 25 years ago a company of swindlers bought rough diamonds and scattered them in a likely locality in Arizona and then led out a party of capitalists who picked up the diamonds and thereupon invested several hundred thousand dollars. Gold mines are favorites with 'salters.' A crude method is to shoot fine gold into an ore face from a shotgun or to paint a portion of a vein with chloride or cyanide of gold. The writer has received from promoters for assay samples of black sand containing gold shavings—the salting being so crude that the shavings still retained the milling marks of the coin. Other samples had gold fastened to the quartz with pine-tree gum, so smeared over as to be almost unnoticeable.

Measuring the prospect in former times was more difficult than at present. Then it was usually necessary to sink shafts and dig level tunnels before reliable estimates could be made. Now it is often possible to size up the ore body by the use of diamond or other drills. When soft rocks are to be drilled, a rotary drill is most advantageous. In harder rocks a blow is given by a drill suspended from a stiff rod, jointed rod, or a rope. The drill tool may be of the churn, shot, or diamond drill type. The latter is best where the rocks are homogeneous and hard.

Great care should be exercised in finding length, breadth and depth, in order to avoid inaccuracies and misrepresentation. Drills, narrow trenches, and excavations may all be necessary to draw safe conclusions as to the promise of the ore body. Sulfids decompose, the lighter materials wash away, producing a concentration, and oxidation often enriches the surfacial deposits. For example, chalcopyrite ($CuFeS_2$) oxidizes to cuprite (Cu_2O), which is richer than the original. The prospector should consider not only the ore body but the means for

development. Water and wood are as necessary as ore. Fuel for running the machinery is required. Transportation for machinery and supplies for the workmen and for the outgoing ore are absolute necessities. A large body of low-grade ore is more to be desired than a small vein of exceeding richness. The next step after locating, assaying, and measuring is *developing*. The method employed depends upon the nature of the deposit. Bedded deposits, or those in veins, require different working than do superficial and disseminated deposits.

Gold in gravels may be washed in a cradle, or a reservoir may be built, the water led from it by a flume, through pipes with sufficient fall to furnish a good head and then, by means of a giant nozzle played upon the gravel bank, tearing up the mass and washing the gravel through sluice boxes. In the bottom of these boxes cross cleats of wood have been fastened and behind them the gold collects. This is called *hydraulic* or *placer mining*.

Bedded deposits are often worked in open day by simply quarrying, as in the Mesabi iron mines, in many kaolin, gypsum, tripoli, and at many lead and zinc mines, and in the Kimberly diamond mines in the early days of the industry. When preliminary stripping is required it is often done by means of steam shovels.

Veins and the majority of deposits usually require the sinking of *shafts*, driving of *tunnels, cross cuts, ore chutes, gang-ways*, etc., at different levels; extensive timbering, the use of powerful hoisting, pumping and ventilating machinery.

Shafts may be vertical or inclined. The latter are more usual in coal mines where tunnels are inexpedient, and the former in metal mining. Shafts are commonly seven to twelve feet square, well-like excavations, fitted with timbers when passing through soft materials and extending often to great depths. In the Lake Superior copper mines they have reached nearly 5,000 feet in depth. In Cornwall and in the Harz mining regions, and in southern Africa mines have been carried to great depths. The building of a shaft may cost from $50,000 to $250,000. In early days, and unfortunately still in many mines, the miners ascend and descend laboriously by means of ladders. The ladders, 25 feet long, extend from one platform to the next. In the top of the platform is a circular opening, through which the miner passes to begin the ascent of the next ladder above. Some mines are half a mile in depth and it requires an hour for the weary miner to reach the surface from his work in the lowest diggings. In other mines the miners make use of buckets suspended by ropes to a windlass turned by man, and the ores are handled in the same manner. In some well-equipped mines are the so-called 'man engines,' where long shafts furnished with platforms at different levels are alternately raised and lowered for short, appropriate distances past each other. The miners, wishing to de-

scend, step from one platform to the other at the right moment and are thus carried down. More general is the employment in well developed mines of tubs and cages attached to round or flat steel cables fastened to a drum controlled by powerful engines. These convey the workers up or down with startling rapidity. While descending, say to a thousand foot level, the speed is so great that, as it is slackened at the approach to the desired level, it seems to the visitor that he has begun to ascend. Enormous quantities of ores are handled in the course of a day in well equipped shafts. In many districts the law requires that every mine shall be provided with two shafts at least. Through the shafts are run, also, pipes for drainage, for ventilation, for conveying compressed air, and electric wiring, for driving drills and lighting purposes.

From the shafts at various depths horizontal tunnels or *drifts* are run. In the Kimberly mines they are every 40 feet apart, in our western mines from 50 to 100 feet. Through them the ore is hauled to the shafts. From the tunnels, which are commonly parallel to the vein *cross-cuts* to the vein are driven. From one drift or cross-cut to the next below, *ore chutes* are dug in order that the ore may be dropped into cars, the miner preferring to handle the ore by gravity rather than by lifting power. In various places, generally on the vein, running from one level to another, small shafts called *winzes* are excavated for purposes of ventilation.

If a view of all the different workings of a well developed mine could be obtained at once it would appear like a series of ground plans of a city, with streets at right angles to each other, each level representing a different group of streets and each connected with those above and below with numerous shafts.

Ore is excavated or *stoped* at the ends of the drifts. If the rock be hard, as is usually the case in metal mines, holes are drilled with hand drills, or, better, with electric or compressed air. Hand drills are still used in mines not well financed. Under some conditions the electric drills are advantageous, but for most purposes the compressed air drills are the best, since the air given off by them aids in ventilation and in lowering the temperature. The holes are charged with explosives like dynamite or giant powder and fired. After blasting the broken rock is roughly sorted by hand and loaded into tubs. One man can lift six tons five feet in ten hours. The tubs are hauled on trucks running on rails by men or mules or steam or electrical power to the shaft and carried up to the part of the mine which is above ground.

Drainage of a mine is aided by so choosing the entrance that the bottom of the shaft or the mouth of the tunnel are at the lowest point, and from thence the excavation is so made as to allow the water to flow through this lowest point. The depression at the bottom

of the shaft is called the *sump*. The water collecting in it is pumped out. In mines in backward communities, like the gem mines of Ceylon, of Penna, India, or the Ural mountains, or the 'poor man's mines' in the western United States, the water is hauled out in jars or pails by hand. In highly developed mines, like many in Australia, South Africa, Germany, England, Michigan, Missouri, Montana, Colorado, powerful pumps capable of raising millions of gallons daily are used and pour out a veritable river of water. A lack of water in a mine is a greater drawback than an excess, inasmuch as the workings above ground require a large quantity of water.

Attempts are often made to carry off excess water by other methods than by pumping. At the Comstock mine, Adolph Sutro excavated a tunnel nearly four miles long at a cost of nearly $2,000,000 for the purpose of draining the mine. And in Cornwall, a series of mines are drained by a tunnel nearly 30 miles long.

Ventilation is as necessary as any other provision on account of the poisonous gases and high temperatures which are often found in mines. *Fire damp* (carburetted hydrogen) and *choke-damp* (carbon dioxide) are especially common in coal mines. The former leads to deadly explosions and the latter extinguishes the lights of the miners and tends to suffocate the workers. In addition to these gases there are sulphuretted hydrogen, gases developed by the explosion of powder, and so forth. The temperature in these mines is often high because of the increase of heat with the increase of depth or because of the presence in the vicinity of igneous rocks not yet thoroughly cooled, or of hot waters. In the Comstock mine boiling waters were repeatedly encountered which, on one or two occasions killed the miners, but quite generally made the temperature so high that the men were unable to work more than half an hour before they became exhausted and had to be carried out.

Ventilation is often accomplished by digging an air shaft at the farthest end of the mine and lighting fires in the bottom of the shaft or placing fans so that the air coming in at the mouth of the tunnel is carried through and up the shaft in the manner of a chimney. Compressed air is often carried deep within the mine through pipes, borne along by the means of fans and controlled by doors properly placed. The most advantageous method is by suction in order that dangerous gases may be rarefied.

Timbering must be resorted to in all mines where the surrounding rock is not of sufficient firmness to keep open the shafts and tunnels. Throughout the west, in regions where forests are scarce, the matter of timbering is a serious question, involving great trouble and expense. It is said that in some mines the timber employed nearly equals in value the profit in the ore produced. In the United States in 1905 timber worth $16,455,887 was

used in mines. Falling roofs are one of the great sources of danger to the miner. When stoping at the end of a drift, a mud or water cavity may be tapped with destructive results. By explosions of carburetted hydrogen, by the oxidation of unstable sulphides, or by the flames from the lamps of careless miners destructive fires are often started and sweep through well timbered mines. Accidents often occur from the falling of machinery in the shafts.

Coal mining presents some problems different from those met with in metal mining. Since great quantities of cheap materials must be handled economically it is advantageous to open a coal mine by horizontal or slightly inclined tunnels. The presence of coal in new regions has often been detected by following the course of streams and noting the excavations in strata in position or by following the 'float.' After the location of a coal bearing stratum coal is usually expected wherever such strata outcrop. The use of the drill often enables the prospector to definitely mark off the boundaries of his mine. Four points are to be considered in opening such a mine. The entrance should be double, made at the lowest point accessible for transportation and the disposal of waste. Second, heavy pillars should be left at all points and especially near the entrance; third, there should be a carefully planned system of cross entrances; and fourth, great care should be exercised in providing substantial timbering.

In the best equipped mines compressed air drills and channelling machines are used. The mines are lighted by electricity and the cars are hauled by the same means. There are two methods commonly followed known as the *long wall,* where the excavation proceeds along a wall, the refuse material furnishing the support for the roof; and the room and pillar method, where chambers are excavated and where pillars are left in position until such time as the mine is about to be closed, when the pillars also are drawn and the roof is allowed to cave in. Unfortunately in many mines the best coal only is removed and the rest irretrievably buried. In addition to this waste of coal is that practiced in removal where millions of tons are slacked by exposure to air and water. It is estimated that at least one-quarter of all the coal removed is thrown away. Add to these two sources of waste that practiced in its use and it appears that not one-tenth of the full fuel value of coal is obtained. The dangers from gases are especially great in coal mines. At the Scott Mines, Pictou co., Canada, 1893, Aug. 8, lightning ran down a shaft and caused a fatal explosion. The cause of the explosion 1907, Dec. 6, at Monongah, W. Va., which cost the lives of 344 miners—the most destructive explosion that has occurred in the United States—is not known. The value of the coal mined in the United States exceeds that of any

other mineral. In 1906 it amounted to over $566,000,000.

The most productive coal mines of the United States are in Pennsylvania, West Virginia, Ohio, Indiana, Illinois, and Michigan. A geological section of almost any of these mines would show the following succession of strata from the top toward the bottom: limestone, sandstone, gray shale, coal, fire clay, shale sandstone and conglomerate—approximately the same strata repeating themselves for several different horizons.

The next product of the mines in value after coal in the United States is copper. Copper, gold, which ranks number five in value, and silver, which ranks ten, are mined and milled under quite similar conditions, since these metals usually occur together. The containing rocks are usually either igneous or metamorphic rocks penetrated by veins usually from a few inches to a yard in width, running toward any point of the compass and sometimes extending to great depth. At Keweenaw Point the copper mines have furnished greater masses and larger amounts of pure copper than have the mines of any other place in the world. The mines at Butte and in south central Arizona are the chief producers of copper sulphide and carbonates. At these localities and most generally in other localities also, gold and silver are associated with copper ore. All sulphides require preliminary roasting and smelting. Free milling ores, such as many gold ores, are first concentrated by pan, cradle, sluice-box, pointed box, Oregon Tom, or an inclined agitated board (called the *frame, tye,* or *buddle*) upon which the ore is fed. Usually the ore requires crushing in a crusher. It is then sent between rollers or pulverized under *stamps* until it becomes an impalpable dust, when it can be washed through a sieve which has 200 strands to the inch and is run over an *amalgamated plate,* carried onto a *jigger,* and finally distributed to various places by means of a corrugated rubber belt called a *vanner.*

The number of gold mines in the United States in 1906 that were producing ore and concerning which reports were handed into the United States government were 4,430. Of these, 1,125 were in Alaska, 1,007 in California, 600 in Colorado, and smaller numbers in many states, chiefly those west of the Mississippi river.

Colorado is the leading state in the production of gold, having produced over $25,000,000 in 1905, California over $19,000,000, Alaska more than $14,000,000, and South Dakota nearly $7,000,000. Twenty-one states and territories contain gold mines.

The next mineral in value of production is iron. The value of iron ore mined in 1906 was $107,000,000. If the value of the pig produced from this ore were considered it would place this mineral second in the list at $453,000,000. Such a ranking would hardly represent a

just comparison, inasmuch as the value of any product is naturally increased by the transformations through which it may be put in the manufactures. For example, iron ore has been produced in Minnesota (1897) as cheaply as 72 cents per ton. At that time pig iron was worth $12 per ton, steel rails $17 per ton, 1-in. screws $1,000 per ton, steel wire $3,000, sewing needles $7,000, fish hooks $20,000, watch jewel screws $3,000,000, watch hair springs $16,000,000.

Iron mines are found in the Archæan in the eastern United States, in the Precambrian in the Lake Superior district, in the Silurian in Missouri, the Carboniferous in the eastern United States, in the Tertiary in Arkansas and Texas.

The productive mines are in three main geographical regions in the United States: (1) the Appalachian region, embracing Pennsylvania, Virginia, Tennessee and Alabama as the most productive states, and where the ores are mostly non-Bessemer, inasmuch as they contain over 5 percent phosphorus; (2) the Lake Superior region, where the ores, chiefly hematite and magnetite, are of Bessemer quality. The mines of this district, especially of Michigan and Minnesota, are the most productive of any in the world. To the mines of Menominee, Marquette, Penokee-Gogebic, Vermillion, and Mesabi ranges is due the leading place which the United States holds in iron production in the world. (3) The western region embracing an extensive territory in Missouri, Texas, Colorado, and Oregon is as yet but slightly developed. Twenty-eight states contain iron mines.

The next mineral in value of production is clay, more than $161,000,000 worth of clay products having been produced in 1906. The amount of clay mined is rapidly increasing and the quality available is practically inexhaustible. As population becomes more crowded and greater inroads are made upon our limited supply of iron and wood for building purposes, the use of clay products will be enormously extended until the industry surpasses all others. Clay is found in all parts of the country.

Besides the above mentioned mineral products there were last year in the United States 20 other mineral substances mined, every one of which increased the wealth of the country by more than $1,000,000. Named in order of their value, they are: Petroleum, $84,000,000; stone, $63,000,000; gas, $46,000,000; lead, $39,000,000; silver, $37,000,000; cement, $35,000,000; zinc, $27,000,000; lime, $24,000,000; phosphate, rock, and sand, each, $12,000,000; mineral waters, salt, nickel, sulphur, each $6,000,000; slate and aluminum, each $5,000,000; gypsum, $3,000,000; antimony, quicksilver, borax and asphalt, each more than $1,000,000. Altogether, about 100 valuable mineral substances are mined, and in 1906 they increased the wealth of the United States by the enormous sum of $1,902,505,206, making the United States

by far the leading country in the world in mineral production. The substances mined are classified as fuels, metals, structural materials, abrasive, chemical, pigment, fictile, ornamental, and miscellaneous materials.

Among the metals, besides those described above, lead and silver are worthy of attention. Nearly equal amounts of these are produced yearly. In the Cordilleran region they occur together. No silver mine is more famous than the Comstock. In 14 years (1861-75) it yielded $169,000,000 worth of ore, 55 per cent. of the value of which was silver and 45 per cent. gold. During 5 years (1867-72) nearly $500,000 was spent in exploitation and development without any returns. In 1873 a mass of ore called the Great Bonanza was encountered and yielded ore worth $632 per ton, and thereafter the region yielded great amounts of the precious metals until 1878, when the miners were in *Borasca.* Since that time the Comstock lode has been intermittently mined but has yielded returns scarcely great enough to justify the expenditures involved. Utah, Idaho, Arizona, New Mexico, California, South Dakota, Michigan, and some of the eastern states have yielded silver ore in greater or less amounts. Mexico is the second country in the production of silver of the world. South America has long been a great producer. The Potosi mine in Bolivia at one time produced more than $9,000,000 worth of silver annually. In general, the South American mines produce native silver, while the United States and Mexican mines produce native silver and argentiferous galena, and European complex sulphides.

Large quantities of lead are produced in the Mississippi valley region, where the lead is associated with zinc. There are three chief regions in lead production in the United States: (1) the Appalachian, where the veins are in metamorphic rocks; (2) in the upper Mississippi region—Wisconsin, Iowa, and Illinois—where the mines are in horizontal limestone which contain the lead sulphide in flats and pitches; and (3) the Missouri, Kansas, Arkansas region, where the lead occurs chiefly disseminated, or bedded, in the Palæozoic limestone. Spain has the most productive lead mines, while the United States takes second rank, Germany and Mexico coming third and fourth.

The most productive zinc mines are found in Belgium, while the Siberian mines rank second, and those of the United States third.

Practically the only quicksilver mines in the United States are those that were opened up in California about the same time that gold was discovered there—a most fortunate occurrence, inasmuch as quicksilver is so essential to gold production. The quicksilver is united with sulphur to form the mineral cinnabar, although globules of the pure quicksilver are found in the same limestone that incloses the cinnabar.

Fifty-one states and territories in the United States

contribute to the mineral resources of the country. Pennsylvania adds more to the mineral wealth than any other three states; Ohio comes second; Illinois, third; West Virginia, fourth; Montana, fifth; New York, sixth; and Alabama, seventh.

South African and Australian mines have contributed enormously to the world's supply of precious metals. Nearly all portions of the earth's surface contain one or many mineral substances which may be utilized for man's profit. These resources are but awaiting knowledge, energy, and capital sufficient to transform them into useful substances. The work of the miner is one of the most worthy and honorable that can be performed and much of it has an enduring character; for example, the stones that are quarried for buildings, the gems that are mined for ornaments, and the gold which is dug for coin and objects of luxury, are not destroyed by one using, but endure for years and possibly for centuries to serve their function of utility or beauty.

Electricity in Mining.—Of late years the electric motor has been utilized for all classes of work—drilling, coal cutting, hoisting, pumping, ventilating, etc., increasing the output of the mine and reducing the cost of production. There are many economies resulting from the general flexibility and applicability of the electric system, making possible the centralization of the power generating plant, the laying out of the mine in the manner most conducive to economical working, the improvement of mine conditions, decrease in the number of men required to operate boilers, engines, pumps, blowers, etc., a reduction in the cost of repairs, the installation of hoists, blowers, or pumps at points where they would otherwise not be used on account of distance from the central power plant, the avoidance of the objectionable exhaust from steam engines, a saving in space requirements for machinery in general; and, finally, the provision of a safe, efficient, and economical means of lighting the mine.

The electric systems suitable for the operation of mining plants are as follows: (1) Direct current for haulage, power, and lighting. (2) Direct current for haulage, and polyphase alternating current for power and lighting. (3) Polyphase alternating current at high potential for power distribution to substations, where it is converted into direct current or to low potential alternating current, or both.

The first system is adapted to mines in which power is not transmitted a great distance. The generating station should contain two or more direct current dynamos connected according to either the two-wire or the three-wire system. If the three-wire system is used, it will be found advantageous to install the Westinghouse three-wire generator, which supplies direct current at two voltages, one twice the other; otherwise it will be necessary to have two machines always in operation, or some

more complicated form of balancing apparatus. The three-wire generator can be operated on the three-wire system in connection with other direct current machines of the ordinary two-wire type.

The second system is adapted to the same class of work, but embodies a further advantage, which is particularly important in the case of coal mines. The alternating-current induction motor with revolving secondary of the squirrel cage type has neither brushes, commutator, slip rings, nor other moving contacts, is, therefore, entirely sparkless, and its use involves no danger from explosion or fire. The absence of brushes or commutator is, moreover, an immense advantage where motors are intrusted to the care of unskilled labor and exposed to dust and dirt. The power plant for this system must necessarily contain either a direct-current dynamo to operate the haulage system and an alternator for the power and lighting, or a double-current machine which generates both direct and alternating current. If the amount of direct current required is relatively small, it may be advantageous to install alternating-current generators with a rotary converter or motor-generator to supply the direct current.

The third system is adapted to those cases where a large number of mines can be operated from one central power station. This plan greatly reduces the number of men required in the power plant, as well as the cost of buildings and apparatus. It also makes possible the utilization of water-power, thus doing away with steam boilers and firemen, and permitting inexpensive water-wheels to be substituted for costly steam engines. By the use of a high voltage, alternating current may be transmitted economically to almost any distance. At the mines it may be transformed into direct or alternating current of a voltage suitable and safe for the operation of mining machinery.

Electric Locomotives.—The saving effected by the use of electric locomotives in mine work is immense. The cost of maintenance is less than with any other system of traction, but the greatest saving, as compared with either animal or mechanical haulage, is in the cost of attendance. The compactness of the electric locomotive makes it perfectly adaptable to low and narrow entries. There are no moving parts exposed to external injury; the mechanism is of the simplest character and the running parts are easily accessible. It may be used upon temporary tracks and in crooked passageways where the installation of a rope-haul system would be impracticable. An electric locomotive may also be used to distribute the cars to room partings, work which with a rope system would require extra men and mules. For the hauling of slag to the dump it is the most economical and serviceable motor power.

Electric Hoists.—The great utility of the electric hoist in mining work is due to the ease with which the electric motor can be controlled and to the fact that an

electric hoist equipment requires little space and may be installed wherever needed. Electric distribution does away with many small boilers and engines, permitting the power plant to be consolidated under one roof. The types of motors most suitable for hoisting work are the direct-current series and compound-wound motors, and the alternating-current induction motor. The series motor is valuable if a very high starting torque is desirable, but close speed regulation is not required. If there is any possibility that the motor might race the compound-wound motor should be used. The compound-wound motor has the high starting torque of the series motor, but resembles the shunt motor in that it will not exceed a certain speed when the load is thrown off. A controller suitable for motors of this class consists of an iron box containing resistance, a commutator composed of a number of contact blocks, each of which is connected to the resistance at a suitable point, and a set of brushes mounted on a rocker arm. The direction of rotation of the motor depends upon the direction in which the controller handle is moved from the neutral point.

Compressed Air.—In many mines where electric-power distribution has been adopted, compressed air is still employed for the operation of small tools, drills, and coal cutters. In such cases, electric motors are used to drive the air compressors, which, in consequence, may be placed conveniently near the point of application of the air, thus avoiding long and complicated systems of piping. Both pumps and compressors require a practically constant torque, or turning moment, in the motor. The speed variation demanded is usually small. If power distribution is by direct current, motors should generally be compound wound, and, if necessary, the speed may be varied by means of a rheostat in the shunt field. The series winding prevents the heavy fluctuations of current that would take place in a simple shunt motor when passing through the different parts of the pump cycle. Where hydraulic pumps supply a long line of pipes, a series winding on the motor easily furnishes the heavy torque required for starting.

Electric Motors.—For the operation of fans and blowers, the electric motor has unequaled advantages. When properly constructed and installed it requires little attention and runs continuously day in and day out with only occasional cleaning and oiling. This point is especially important since it is often desirable to locate ventilating fans at unfrequented points and at considerable distances from the power-house. A point which sometimes may be of considerable importance where a large number of motors are located at widely separated points throughout a mine is that the alternating-current induction motor and the direct-current series and compound motors, will start and stop with the starting and shutting down of the main generators in the power-house. If by reason of an accident or other

cause the current supply is stopped, all the fans and other machinery in the mine may be started again promptly when the power is turned on without visiting the different points where the apparatus is located. This is a feature which might be of great importance in many instances. It is possible to start and stop the induction motor at any time from any distant point by simply opening or closing the main circuit. The series and compound motors may also be controlled easily from a distance.

In placer as well as in lode mining, electric power may be employed advantageously for pumping and for hoisting either direct or by derrick. It is essentially applicable to dredging apparatus, since it admits of the operation of dredges where fuel is hard to obtain or expensive, and makes possible the carrying on of the work at night.

Compressed-Air Mining Machinery.—Notwithstanding the widespread use of electricity in mine applications involving power, compressed air has many advantages in certain situations. In coal mining it is extensively employed. Fan engines, pumps, etc., can be driven with air without condensation losses, without trouble from dampness, and without fire risks, in connection with the machinery already in place, and perfectly understood by present employees or other labor obtainable anywhere. Rock shafts, rock roofs, tunnels and floors can be reduced to a power basis with great saving in time and cost. Air assists ventilation everywhere, clears away the smoke at once from a room or entry which must be pushed, drains the low spots, or pumps the heaviest floods with common pumps, requiring no more skillful handling than the most careless boy about the works is equal to, and all this beyond the possibility of being drowned out. Blacksmith fires and steam hammers are operated at the touch of the foot. Ventilation is assured in remote places, in case of a choked airway, or any restricted place. The air lines are laid throughout the mine, and the engine-room may be equipped with a powerful fire pump. Each air hose may then be used to carry a strong stream of water to the coal face at need, a pipe line being a factor of safety and not of risk. Compressed air, like electricity, has seen the time when, not being understood, it has been applied wastefully. Air is merely a transmitter of power, just as electricity or a wire rope is; but, correctly used, it is inherently economical, being practically a perfect gas. Important developments are continually being made, and the future promises much in the advancement of compressed-air appliances.

Signaling in Mines.—Effective signaling in mines requires a great variety of apparatus, such as telephones, telegraphs, bells, and appliances for sending signals according to the indications upon a dial. Of late years the telephone has advanced beyond other methods of signaling, and special types of instruments, intended for

mining work, are made with regard to conditions of exposure, damp, etc. It is generally recommended that telephones be put in all permanently installed motor-rooms, so as to enable the men in charge underground to inform the engineer at once of any breakdown of motors, machinery, etc., and, if necessary, obtain assistance speedily.

Ventilation and Drainage.—In the development and operation of extensive mining enterprises, ventilation and drainage are in many instances a source of expense and cause of numerous difficulties. The cumbersome and expensive Cornish pump system of mine drainage has in late years been largely displaced by modern steam, electric or hydraulic pumping engines, which have a greater efficiency and greatly decreased expense in first cost, as well as in operating expenses. The method of mine drainage by means of automatically operated skips has also been improved, and in some instances this method of mine drainage is preferred to any other mechanical means, though where the amount of water to be handled daily is very large a special shaft and hoisting equipment is desirable, if not necessary, in order to admit of the product of the mine as well as materials and men being handled. The means of ventilation have also been improved over old practice by the introduction of large and better ventilating fans and reversible current devices. Although these much desired improvements have been made in the mechanical devices for handling water and for ventilating the workings, the method par excellence for both drainage and ventilation is by means of tunnels.

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MINING SCHOOLS. The need of technical schools specially equipped for preparing young men for the profession of mining engineering was long ago recognized, and some of the institutions have exerted through their graduates a marked and beneficial influence upon the mining industry of the world. The best known of the European mining academies are those at Freiberg (Saxony), Clausthal, Aix-la-Chapelle and Berlin (Prussia), Leoben and Przibram (Austria), Paris and St. Etienne (France), and London (England). In addition to these, separate schools for mine foremen are maintained at Freiberg, Clausthal, Aix-la-Chapelle, St. Etienne, Przibram and elsewhere. The leading schools of the United States are: the School of Mines of Colum-

bia University, the Mining Department of the Massachusetts Institute of Technology, the College of Mining of the University of California, the State School of Mines of Colorado, the Michigan College of Mines, the School of Mines of the University of Minnesota and the schools at Lehigh University and Lafayette College. The courses of study occupy four years, but exhibit quite wide variations in plan and scope, though generally consisting of the following:

First Year.—Algebra—general theory of equations, analytical geometry, spherical trigonometry, general inorganic chemistry, qualitative analysis, physics, descriptive and determinative mineralogy, including crystallography and blow-piping, theory of surveying and mechanical draughting. In the following vacation, five weeks' field practice in surveying.

Second Year.—Calculus, elementary and analytical mechanics, physics, industrial chemistry, theory of railroad surveying, general geology, elements of electrical engineering, quantitative analysis, descriptive geometry and drawing. In vacation, five weeks' field work in general surveying and four weeks' railroad surveying.

Third Year.—Analytical mechanics, economic geology, properties and resistance of structural materials, masonry and timber construction, engineering of power plants, earth and rock excavation, railroad and mine tunnels, boring and shaft-sinking, exploration, development and methods of working mines, general metallurgy, and metallurgy of the non-ferrous metals, graphic statics, assaying, principles of electrical engineering, experimental mechanical engineering, optical mineralogy and petrography. Vacation work: five weeks' systematic study in mines, one week's study in metallurgical works and one week of field geology.

Fourth Year.—Thermodynamics, steam engines and boilers, heat and its applications, motors other than steam, hydraulics, ore-dressing, mine engineering, mine plant and equipment, mine surveying, mine administration, metallurgy of silver, gold, iron and steel, draughting and design of mine plant, geological examinations and surveys, thesis or project in mining. Laboratory work is required in connection with geology, mineralogy, physics, qualitative and quantitative analysis, assaying, testing of materials, electrical engineering, metallurgy and ore-dressing.

MINION, n. *min'yŭn* [F. *mignon;* It. *mignone,* a darling, a favorite; Dut. *minnen,* to love: comp. Gael. *min,* soft, gentle]: a favorite, particularly of a prince; a low or unprincipled dependent or flatterer; among *printers,* a letter of a particular size. MINION-LIKE, daintily.

MINISH, v. *min'ish* [F. *menuiser,* to minish, to extenuate—from mid. L. *minutārĕ,* to reduce to fragments—from *minūtus,* small]: another and now obsolete spelling of DIMINISH, which see.

MIN'ISTER, n. *mĭn'ĭs-tér* [F. *ministre*—from L. *minister*, an attendant, a servant—from *minus*, less: opposed to *magis'ter*, the person in superior place—from *magis*, more]: pastor of a church; a clergyman (see CLERGY): in the governmental administration of a country, the head of a department of government appointed by the chief executive or by the sovereign (see MINISTRY, in Executive Government); in diplomatic affairs, the representative of a national government or of a sovereign at a foreign state, but (in the strict use of the term though not always in popular use) without the dignity of an Ambassador (q.v.—see also MINISTER, in Diplomacy); V. to give aid or relief, as to the sick or poor; to perform, as the duties of an office. MIN'ISTERING, imp. *-ĭs-trĭng:* ADJ. attending and serving; affording aid or things needful. MIN'ISTERED, pp. *-térd.* MINISTRATION, n. *mĭn'ĭs-trā'shŭn*, the office of a minister, or the service performed by him; agency. MIN'ISTRA'TIVE, a. *-tĭv*, affording service; assisting. MIN'ISTE'RIAL, a. *-tē'rĭ-ăl*, pertaining to ministers of religion, or to the chief servants of a state or sovereign; official; executive; attendant. MIN'ISTE'RIALIST, n. *-ăl-ĭst*, in *politics*, a supporter of the ministry holding office. MIN'ISTE'RIALLY, ad. *-lĭ*, in a ministerial manner; after the manner of the executive; officially. MIN'ISTRANT, a. *-trănt*, performing service as a minister; attendant on service. MINISTRY, n. *mĭn'ĭs-trĭ* [L. *ministĕrĭŭm*, service, attendance]: agency or service of a minister of religion; the office, duties, or functions of the chief ministers of a state or sovereign; the period of duration of such official function; the body of ministers of a state; the clergy collectively (see CLERGY): agency; interposition; employment. PRIME MINISTER, in Great Britain, the first lord of the treasury, and head of the British government, who appoints his colleagues. CABINET MINISTERS, or executive government, in Great Britain (see MINISTRY, in Executive Government).—SYN. of 'minister, n.': priest; parson; official; ambassador; delegate;—of 'minister, v.': to serve; attend; wait upon; officiate; administer; contribute;—of 'ministerial': ecclesiastical; clerical; sacerdotal; priestly.

MIN'ISTER, in Diplomacy: delegate or representative of a national government or of a sovereign at a foreign court to treat of affairs of state. Every independent state has a right to send public ministers to, and receive them from, any other sovereign state with which it desires to be in amity. Semi-sovereign states have generally been considered not to possess the *jus legationis*, unless when delegated to them by the state on which they are dependent. The right of confederated states to send public ministers to each other, or to foreign states, depends on the nature and constitution of the union by which they are bound together. The constitution of the United Provinces of the Low Countries and of the old German Empire preserved this right to the individual states or princes, as do the present constitutions of the

German Empire and Swiss Confederation. The constitution of the United States either greatly modifies or entirely takes away the *jus legationis* of each individual state. Every sovereign state has a right to receive public ministers from other powers, unless where obligations to the contrary have been entered into by treaty. Diplomatic usage recognizes three orders of ministers. Ministers of the first order possess the representative character in the highest degree, representing the state or sovereign sending them not only in the particular affairs with which they are charged, but in other matters: they may claim the same honors as would belong to their constituent, if present. This first class of diplomatic agents includes papal legates and nuncios, and ambassadors ordinary and extraordinary. A principle of reciprocity is recognized in the class of diplomatic agents sent. States possessing the honors of royalty send to each other ministers of the first class; so in some cases do those states also which have not such honors; but it is said by some writers on international relations that no state having such honors can receive ministers of the first class from states not possessed of them. For the states that are held to possess royal honors, see DIPLOMACY.

Ministers of the second and third order have not the same strictly representative character; their representation is held not to go beyond the affairs with which they are charged. They are, however, the natural protectors of the subjects of the state or country sending them in the country to which they are sent. Ministers of the second class include envoys, whether these are simply so styled, or denominated envoys extraordinary, also ministers plenipotentiary. The third class of ministers does not differ from the second in the degree of their representative character, but only in the diversity of their dignity, and the ceremonial with which they are received. This class comprehends ministers, ministers resident, ministers chargés d'affaires, such consuls as are possessed of a diplomatic character, and those chargés d'affaires who are sent to courts to which it is not wished to send agents with the title of minister. Ministers of the third class have, for the most part, no letters-credential from the chief executive or the sovereign, and are accredited only by letters to the foreign minister or secretary of the country to which they are sent.

Besides these orders of ministers, other diplomatic agents are occasionally employed—e.g., deputies sent to a congress or confederacy of states, and commissioners to settle territorial limits or disputes concerning national jurisdiction. These are generally considered to possess the privileges of ministers of the second and third order. Ministers-mediators are ministers sent by two powers, between which a dispute has arisen, to a foreign court, or congress, where a third power, or several powers, have, with the consent of the two powers at variance, offered to mediate between them.

Diplomatic ministers, except, as above mentioned, those of the third class, are accredited by a letter to the chief executive or the sovereign of the country to which they are sent. The letter of credence is usually dispatched under a *cachet volant*—i.e., a seal which does not close the letter; or else, in addition to the principal letter, an authenticated copy is sent, which the diplomatic minister on his arrival presents to the minister or secretary of foreign affairs, as the warrant for his right to demand audience of the personal head of the govt. or the sovereign; the original is presented to the personal head of the govt. or the sovereign. Ministers sent to an international congress or diet have usually no credentials, but merely a full power, of which an authenticated copy is delivered into the hands of a directing minister, or minister-mediator. A minister of the first class is received to both public and private audiences by the chief executive or the sovereign to whom he is accredited; a minister of the second class generally to private audiences only. Diplomatic ministers are entitled to conduct negotiations either directly with the sovereign or chief executive, or with the minister or secretary for foreign affairs. The latter course is more usual, and generally more convenient.

The U. S. govt. until 1893 allowed its accredited representatives at foreign courts no higher rank than that of minister, but in that year Congress empowered the Pres. to raise to the rank of ambassador extraordinary and plenipotentiary the American minister accredited to any state which should previously confer a similar promotion upon its minister at Washington. Great Britain, France, Italy, and Germany quickly promoted their representatives at Washington, and the U. S. raised the rank of her representatives at the courts of St. James, Paris, Rome, and Berlin. For the rules and usages of the U. S. diplomatic service, etc., see AMBASSADOR: DIPLOMACY. The title 'Excellency' has, since the peace of Westphalia, been accorded to all diplomatic ministers of the first class; and in some courts it is extended to ministers of the second class, or at least those sent by the great powers. For the immunities and privileges of diplomatic agents, see AMBASSADOR: DIPLOMACY: ENVOY: CONSUL.

MIN'ISTRY, in Executive Government: the body of ministers of state, or of heads of departments in the government, to whom the chief magistrate or sovereign of a country commits the superintendence of executive administration.—In Great Britain, the CABINET is composed of a limited number of privy councilors holding the more important offices in the M.; and the individuals who thus form the cabinet are selected by the prime minister, who presides at its meetings.

It is a principle of the constitution of Great Britain, that the sovereign is irresponsible, the real responsibility resting with the administrative government. The 'King's Council,' or PRIVY COUNCIL, were the earliest advisers of the sovereign in matters of state, but when

this body, in course of time, was found too large for dispatch of business, its duties were transferred to a small committee of privy councilors selected by the king. As late as in Charles I.'s time, all the more important resolutions of the crown were taken after deliberation and assent of the Privy Council. An unsuccessful attempt was made in the reign of Charles II. to restore the council to its original functions. Its numbers were limited to 30; and it was intended that this limited council should have control of the whole executive administration, superseding any interior cabinet. But the council was found too extensive for an effectively working ministry, and the former arrangement was restored. The cabinet may be regarded as but a committee of the Privy Council (q.v.); and its exclusive right to discuss and determine the plans and business of the govt. has been often said not to be recognized by the law; a position which, however, was disputed by Lord Campbell, who maintained that, 'by our constitution, it is in practice a defined and acknowledged body for carrying on the executive government of the country.' The cabinet is a merely deliberative body; its members collectively have no power to issue warrants or proclamations; but all important measures which engage the attention of the govt., whether regarding matters domestic, foreign, or colonial, and all plans of action, whether purely administrative, or to be carried out in parliament, must be proposed, considered, and adopted by the cabinet. The sovereign intrusts the formation of a ministry to a statesman, who selects for its members those who agree in his political views. He generally places himself at the head of the govt. as First Lord of the Treasury, and in popular language he is called the Premier, or Prime Minister. The Lord Chancellor, the Chancellor of the Exchequer, the Secretaries of State for Home, Foreign, Colonial, and Indian Affairs, the Secretary of War, and the Pres. of the Council, are necessarily members of the cabinet; also generally the heads of various other important departments of govt., including usually the First Lord of the Admiralty, Pres. of the Board of Trade, Postmaster-gen., Pres. of the Poor-law Board, Chancellor of the Duchy of Lancaster, and occasionally Chief Sec. for Ireland. The Premier has sometimes held the office of Chancellor of the Exchequer in conjunction with that of First Lord of the Treasury. A privy councilor of great political weight is sometimes called into the cabinet without office, and takes the post of Lord Privy Seal. Her Majesty's ministers who have usually no seat in the cabinet include the following: Chief Sec. for Ireland, First Commissioner of Works, Vice-pres. of the Board of Trade, Vice-pres. of the Committee on Education, Commander-in-chief, Lord Chamberlain, Steward, Master of the Horse, Master of the Buckhounds, Comptroller of the Household, Lord Lieut. of Ireland, Attorney-gen. and Solicitor-gen. of England, Lord Advocate and Solicitor-gen. of Scotland, and Attorney-gen.

and Solicitor-gen. of Ireland. Occasionally, but exceptionally, the Commander-in-chief, and the Lord Chief Justice of England, have been members of the cabinet. A M. is often spoken of as the M. of the person who is at its head, and sometimes as his government.

Meetings of the cabinet are held on the summons of any one of its members, usually at the Foreign Office. Its proceedings are secret and confidential, and no record is kept of its resolutions, which are carried into effect by those of its members to whose departments they severally belong. As the acts of a M. are at all times liable to be called in question in parliament, it is necessary that the heads of the chief departments should have seats in either house, in order to be able, when required, to give prompt explanations.

A govt. exists only so long as it can command the confidence of parliament. The sovereign has the power to dismiss his ministers whenever they cease to possess his confidence, but such a change would be useless without the support of the house of commons, who, by withholding their support, could paralyze all the functions of government. A sovereign has sometimes rid himself of a M. with whose policy he was dissatisfied, by dissolving parliament, and appealing to the country. Where a M. cannot command the confidence of parliament, i.e., when their important measures are rejected or discarded by its significant vote, they resign, and a statesman of some other political party is sent for by the sovereign, and authorized to form a new cabinet. All the adherents of a M. filling political offices resign with it, also the great officers of the court, and those officers of the royal household who have seats in either house of parliament. Sometimes officers holding lucrative appointments which do not necessitate resignation, have retired, as a manifestation of adherence to their political friends. In addition to the ministers already named, the following adherents of the M. go out of office on a change of govt.: the three junior Lords of the Treasury, the two Secretaries of the Treasury, the four parliamentary Under-secretaries of State, Paymaster-gen., Master-gen. of the Ordnance, Surveyor-gen. of the Ordnance, the five junior Lords of the Admiralty, first Sec. of the Admiralty, Chief Commissioner of Greenwich Hospital, Pres. and Parliamentary Sec. of the Poor-law Board, Pres. of the Board of Health, Vice-chamberlain, Capt. of the Gentlemen-at-arms, Captain of the Yoemen of the Guard, the Lords in Waiting, Mistress of the Robes, Treasurer of the Household, Chief Equerry, or Clerk Marshal, Judge Advocate-gen., and the Lord Chancellor for Ireland. The private sec. to a minister loses office on a change, his appointment being purely personal; and some changes are usually, though not always, made in ambassadors extraordinary.

In the United States there is no M. in the British use of that term: the chief ministers are the superintendents of the great executive departments of government

they are known as secretaries, and as a body they form an advisory conference known as the president's cabinet. They are chosen and appointed by the president, and take office on confirmation by the senate; they hold office entirely at the will of the president, and they administer their functions as under his direction and with immediate responsibility to him. They are held to administer in their respective departments the executive control which the laws vest in the president; thus their functions are of high importance and honor, and their influence is great, so long as they hold his confidence. They meet statedly, or as summoned by the president, in advisory conference; but they are not an executive council issuing orders, nor is the president under any legal obligation either to ask or to follow their advice: this illustrates the fundamental difference between the cabinet of secretaries of the president of the United States, and the cabinet of ministers of the British crown. The members of the cabinet number nine and in order of their succession to the office of president—should it become vacant and there be no vice-president to fill it—they are as follows: Secretary of state, secretary of the treasury, secretary of war, attorney-general, postmaster-general, secretary of the navy, secretary of the interior, secretary of agriculture, and secretary of commerce and labor. In 1908 it was proposed also to add to the above a secretary of education. See SECRETARIES OF EXECUTIVE DEPARTMENTS.

MINIUM, n. *mĭn'ĭ-ŭm* [L. *minĭŭm*, red lead or vermilion]: red oxide of lead; red-lead ore: see LEAD.

MINIVER: see MINEVER.

MINK (*Mustela lutreola*): quadruped, a species of weasel, inhabiting northern Europe and Asia; very similar to which in characters and habits is another species by some regarded as only a variety of the same, the mink or VISON (*M. vison*) of North America, abundant in almost every part of that continent. Both inhabit the neighborhood of streams, lakes, and marshes; have semipalmated feet, are expert swimmers and divers, and prey on fishes, frogs, and other aquatic animals, also on birds, rats, mice, etc. They are covered with downy fur, interspersed with longer and stronger hairs: the color is brown, with more or less white on under parts. The American mink is generally larger than that of the old world, being often more than 18 in. from the nose to the root of the tail, while the latter is seldom more than 12 in. It has also a more bushy tail. It is very active and bold, and often commits great depredations in poultry yards, carrying off a fowl with great ease. Unlike most of its congeners, it is easily tamed, and becomes much attached to those who caress it. In domestication, it ceases to regard the inmates of the poultry yard as prey. It emits an unpleasant odor only when irritated or alarmed. The fur of the mink is valuable.

MINNEAPOLIS, *mĭn-ĭ-ăp′ō-lĭs:* city, cap. of Hennepin co. Minn., on both sides of the Mississippi river, at the falls of St. Anthony; lat. 44° 58′ n., lon. 93° 15′ w.; 8 m. w.n.w. from St. Paul (10 m. by rail and 14 m. by the course of the river); about 838 ft. average elevation above sea-level. About three-fourths of M. lies w. and s. of the river, which enters it on the n. a little w. of the middle of the n. boundary, flows on a curve, which passes to the left of the city centre, and goes s.w. out of the city, thus inclosing in a bow the n. e. quarter of the site. A large island in the river, named after the explorer Nicollet (q.v.), a little n. of the centre of the city, is built on, and both city and railway bridges conduct across it near the heart of the city. A second island lower down, of less size, has another historic name, Hennepin. Above and below the islands several other long bridges span the Mississippi for railway travel or for ordinary passage. The general nature of the site of M. is that of a broad esplanade, nearly level for from one to two m. back from the river, with chains of wooded bluffs beyond, on which there are many fine residences. The situation is healthful, as there are no marshy grounds near, and the natural drainage is excellent. The soil is a sandy loam, above a layer of gravel, which rests on limestone, and that on a soft sandstone. The falls of St. Anthony are overlooked by the city, and 3 m. below it a beautiful resort is afforded by the Minnehaha Falls (q.v.). In the vicinity of M. are numerous lakes, especially on the w. and s.w., which greatly add to the attractions of a remarkably beautiful region. They have already become summer resorts comparable to some of those noted at the East.

The falls which have contributed so much to the prosperity of M., were discovered, and named for St. Anthony, 1680, by Father Louis Hennepin, a priest who accompanied the Fr. explorer Accault in his upper Mississippi journeyings. They remained little known for nearly 140 years, until, 1819, the establishment of Fort Snelling, at the mouth of the Minnesota river, abt. half way between the falls and the site of St. Paul, brought them again under observation. The milit. reservation of Fort Snelling extended over most of the present site of M., and thus included the vicinity of the falls. These occur in the course of a descent of the river amounting to 80 ft. within a m., and 65 ft. within three-quarters of a mile. They are formed by a perpendicular face of sandstone, 18 ft. high, and divided into two by Hennepin Island. The attractions of the spot are those not only of the fall of water, but also of the surrounding view. The division of the river into an e. and a w. channel, gives on the w. side, which has the largest channel, one of the most remarkable water-powers known. Even at a low stage the river precipitates down its bed of solid limestone, 450,000 cubic ft. of water per minute. The force is computed to be equal to 100,000 actual horse-power (or 120,000 theoretical). The shores are of such

a character, passing round the long side of the bend of the river, as to allow canals to be excavated by the side of the stream to any extent, with the best of rock for their walls and bed, yet rock not difficult of excavation. The hard limestone, moreover, of the bed of the river, affords a secure foundation for dams and for mills. The canal by which the power is taken, branches off from the w. channel a short distance above the falls. It is 60 ft. wide and 14 ft. deep, and passes by a course parallel to the river down to the mills. Nothing in the entire system is ever liable to injury by floods, the rise of the river always taking place so gradually as to preclude destructive freshets. There has been some solicitude concerning the ultimate wearing away of the falls. The drawing of all the water through the canals, often leaves the ledge exposed to the rapidly disintegrating action of frost, and when a great volume of water is pouring over the ledge another injurious action results. The easily worn sandstone at the bottom of the falls, is cut away by the water, and the ledge becomes undermined, and liable to give way: 90 ft. did give way at once 1851. The river banks show that the falls have already receded from the mouth of the Minnesota river 9 m.; and there remains only 1,200 ft. in length of the rock bed which makes the falls. The earliest attempt to provide against the peril of destruction of the falls only made the matter worse, but the building of a concrete wall behind the falls and underneath the channel of the river—a wall 4 ft. thick and 38 ft. in height, entirely across the stream, and 50 ft. into the bank on each side—has effectually removed the danger of undermining the ledge. At the same time an apron, or inclined plane, of timber, with heavy crib-work filled with stones, serves to protect the falls from wearing away. This work cost $884,500, of which the United States furnished $550,000, and M. the rest. In 1879 a sluiceway was built on at the w. end of the apron, 6 ft. wide and 346 ft. long, for the passage of logs without damage to the apron. This was done by the U. S. govt., in whose hands the falls now are for preservation.

The river is navigable eight months in the year below the falls, and with proper improvements would have five ft. of water at all times. Above the falls light draft boats may ascend 80 m. at any time, there being two ft. of water at the lowest stage. There are 16 railroads connecting with M., with 15,000 m. of track. The chief lines are the Chicago Burlington and Northern, Chicago St. Paul Minn. and Milwaukee, Wisconsin Central, Minn. St. Paul and Sault Ste. Marie, St. Paul and Duluth, Northern Pacific, Great Northern, St. Paul Minn. and Manitoba, St. Paul Minn. and Omaha, and Minn. and St. Louis.

The climate of M. is healthful and bracing, being especially sought because of the dry and tonic character given by the prevailing winds and by the absence of marshes, or of waters or lands liable to affect it unfavorably. The

COURTHOUSE AND CITY HALL.

highest recorded summer temperature is 101°; the highest in average years 94°; the mean 67°. The lowest winter temperature — 40°; the lowest in average years — 30°; the mean, 12·5.

M. is regularly laid out over 52½ sq. m. of territory; the streets and avenues are straight, usually 80 ft. wide, and in the residence quarters are made attractive by fine grounds, commonly without fences. Shade trees are generally set out; and in all streets outside the business portion about one-fourth the width is occupied by grass and two rows of trees on each side, with foot-walks six to eight ft. wide between the rows. An extended service of horse-cars exists through the chief avenues. The street railway combination covering Minneapolis (52½ sq. m.) and St. Paul (55·44 sq. m.)—the city limits meeting so that the e. side of Minneapolis bounds the w. side of St. Paul—contracted, 1890, Feb., for an electric railway equipment of the entire system, at a cost of nearly $2,000,000, to be in operation June 1. The Sprague Electric Railway and Motor Co. supply under this contract 360 motors. Electric lighting has been introduced.

No artificial parks have been made, the groves, lakes, etc., of the suburbs more than supplying their place. There are four lakes within 3½ m. of the city, also the falls of Minnehaha. There are five cemeteries connected with the city: Lakewood, 3½ m. s. from the city centre, 153 acres; Layman's, 2 m. s.e., 20 acres; Maple, 1½ m. n.e., 10 acres; a Rom. Cath., and a Hebrew cemetery. The water-works are owned by the city. The Holly system of direct pumping is used, with average pressure 53 lbs. The works cost, with mains and pipe 18 m. 3,461 ft. in length, and a daily capacity of 7,500,000 gals., $396,598.83. The gas-works are not owned by the city. The number of fine edifices is very large, including the Chamber of Commerce, the Exposition Building, the residence of W. D. Washburn, which cost $1,000,000, the Post-office, costing $750,000; the West Hotel, costing $1,500,000; the Lumberman's Exchange, the Tribune Building, the Syndicate Block, and the Masonic Temple. There are a city hall, city prison, several engine-houses, two opera-houses, an athenæum, several national and several private banks, ten fine public school buildings, an academy, two female seminaries, and a medical college.

The number of schools is about 30. Higher institutions of learning are the University of Minnesota; the Augsburg Theol. Seminary established 1869 by the Scandinavian Lutherans of the northwest; and Macalester Coll. The churches number over 100, representing 15 denominations, of which the more numerous are the Meth.; Lutheran; Baptist; Congl.; Presb.; Episc.; Rom. Cath.; and Univ. There are six daily and 39 weekly newspapers; also 10 semi-monthly and 13 monthly publications.

The govt. of M. is by a mayor and a board of aldermen, two from each of the ten wards into which the city is divided. The fire dept. is equipped with steam fire-en-

gines, hose carriages, hook and ladder trucks, and an adequate force of disciplined men. A fire-alarm telegraph is in use.

M. is the chief manufacturing and distributing point for the timber lands of the whole upper Mississippi valley. The country in the immediate vicinity is divided between production of grain and of stock. Of the wheat produced in Minn. and sent to market, more than half is manufactured into flour by the mills of M. There are over 20 elevators with capacity of more than 15,000,000 bushels. There are 26 flouring-mills, with capacity of 36,148 barrels daily. They make into flour 20,000,000 bushels of wheat in a year, by processes which have revolutionized the production. The three mills of Washburn, Crosby and Co. can make 6,500 barrels of flour daily, employing 281 hands. The Pillsbury 'A' mill is the largest in the world, and has a daily capacity, fully equipped, of 25,000 bushels of wheat. There were in 1900 2.368 manufacturing establishments, employing 26,688 persons and paying wages $12,708,523; using materials valued at $78,175,735; products, $110,943,043. The principal articles were, flouring and grist mill products, $49,673,568; carpentering, $5,412,038; foundry and machine shop products, $2,570,601, and masonry supplies, $2,267,773. 1902, Sept. 15, there were 4 national banks, cap. $3,250,000, 17 state banks, $2,820,000; 5 fire insurance cos.; assets (of 4 reporting) $1,085,209; liabilities $273,804.

History.—The first saw-mill was built 1822, and grist-mill added, for the use of Fort Snelling. The Indians ceded the lands e. of the river 1837, and 1838 the first settlement was made. Persons from Boston bought a large share of the water-power, 1847, and a dam was completed across the e. channel, from Hennepin Island to the main shore, 1848. Minn. Territory was organized in the winter of 1848–9, but the lands w. of the river were still Indian, and most of the site of M. was within the Fort Snelling govt. reservation. The first permits to occupy land were got 1849, and the first house in w. M. begun. In 1853 there were about a dozen houses. Pre-emption rights were granted 1855, and a town govt. was organized 1858. The city charter dates from 1867. Till this time, the settlement on the e. side of the river had been, from 1849, known as St. Anthony, and had become a city 1855. In 1873 the two were consolidated as Minneapolis. 1890, June, the total milling capacity of M. was over 25,000 barrels a day. Two years before an explosion and fire destroyed six of the largest flouring-mills, half the producing power of the milling district, but they were all rebuilt in the next two years, with increased capacity. Pop. (1870) 13,066; (1880) 46,887; (1885) 129,200; (1890) 164,738;)1900) 202,718.

MINNEHAHA RIVER, *mĭn-ĭ-hâ'hâ* (and FALLS): small stream in Hennepin co., Minn., to which the Dakota Indians gave the name *Minne-haha*, or water-laughing. Half a mile above its mouth, where the channel passes over a limestone precipice 60 ft. high, the waters make falls of remarkable beauty. The mouth of the M. river, where it enters the Mississippi river, is three m. below Minneapolis, and the falls are among that city's most interesting pleasure resorts. The city has provided at the M. falls a site of 51 acres for a soldiers' home, with the design of making it eventually a part of its park system. This home was opened 1887, November.

MINNESINGERS, *mĭn'nĕ-sĭng-êrz:* designation of the earliest lyric poets of Germany, 12th and 13th c.; from *Minne*, love, which was at first their predominating, and almost sole subject. The works of the M. are mostly superior to those of their more generally known contemporaries the troubadours, in delicacy of sentiment, elegance and variety of rhythmical structure, and grace of diction. Henry of Veldig, early in the 12th c. at the court of the Swabian, Frederick Barbarossa, Emperor of Germany, is regarded as the father of the M., and Walther von der Weide (b. abt. 1170) as the last of this great vocal band, which included emperors, princes, nobles, and knights. Many of their productions have perished, though, in addition to a very large collection of poems by anonymous M., there are some remains of the songs of more than 150 known composers. Among the most celebrated of these are: Wolfram von Eschenbach (q.v.), Henry von Ofterdingen, Hagenaue, Hartmann von der Aue (q.v.), Gottfried von Strasburg (q.v.), Otto von Botenlauben, Truchsess von St. Gall, and Ulrich von Lichtenstein—men of noble houses, who, though they belonged to various parts of Germany, wrote almost exclusively in the Swabian dialect, which, during the brilliant days of the Fredericks and Conrads of the House of Swabia, was the language of the court in Germany. Among the few other forms of German employed by the M., the one next in favor was the Thuringian, adopted in compliment to Hermann, Landgraf of Thuringia, who, next to the princes of the Swabian dynasty, was the most munificent patron of the M. during the period of their renown, in the early part of the 13th c. Besides songs in praise of women, the M. composed odes on public or private occasions of lament or joy, distiches or axioms, and *Wachtlieder*, or watch-songs, in which the lover was represented as expostulating with the watchman, who kept guard at the gate of the castle within which his lady-love was imprisoned, and trying to persuade him to grant him admittance to her presence. These songs and odes were recited by the composer, to his own accompaniment on the viol; and as few of the M. could write, their compositions were preserved mostly by verbal tradition only, and carried by wandering minstrels from castle to castle throughout Germany, and even beyond its borders. As the variety of rhythm and

complicated forms of versification affected by the M., especially toward the decline of their art, rendered it difficult to retain by memory the mass of Minnesong which had been gradually accumulated, these itinerant musicians finally made use of written collections, a practice to which alone we are indebted for the many beautiful specimens of early German lyrical poetry which remain. The glory of the M. may be said to have perished with the downfall of the Swabian dynasty under which greater liberty of thought and word was allowed among Germans than they again enjoyed for many ages; and in proportion as the church succeeded in re-asserting its sway over the minds of men, which it had lost under the rule of the chivalric Fredericks, freedom of speech and action was trammelled, and song and poetry contemned. Paraphrases of Scripture, hymns, and monkish legends, took the place of the chivalric songs of the nobly born M., and German poetry was for a time almost annihilated.

In the 14th c., the art of Minnesong was partially revived, though under a rude and clumsily elaborated form, by the *Master-singers* (Meistersingers), a body of men belonging to the burgher and peasant classes, who, in accordance with their artisan habits, formed themselves into guilds or companies, binding themselves to observe certain arbitrary laws of rhythm. Nuremberg was the focus of their guilds, which rapidly spread over the whole of Germany, and gained so firm a footing, that the last of them was not dissolved at Ulm till 1839. As the title of master was awarded only to a member who invented a new form of verse, and the companies consisted almost exclusively of uneducated persons of the working-classes, it may easily be conceived that extravagances and absurdities of every kind speedily formed a leading characteristic of their modes of versification; attention to quantity was, moreover, not deemed necessary, regard being had merely to the number of the syllables, and the relative position and order of the verses and rhymes. Their songs were lyrical, and sung to music; and though, each master was bound to devise a special *stole* or order of rhymes for each of his compositions, these stoles were subjected to a severe code of criticism, enacted by the *Tabulatur*, or rules of the song-schools. Among the few masters who exhibited any genuine poetic feeling, the most noted were Heinrich Mügeln, Michael Behaim, and the Nuremburg shoemaker, Hans Sachs, who prided himself on having composed 4,275 *Bar* or Master Songs. See Tieck's *Minnelieder* (1803); Taylor's *Lays of the Minne and Master Singers* (Lond. 1825); and Von der Hagen's *Minnesänger* (4 vols. 1838).

MINNESOTA, *min-ē-sō'ta:* state, one of the United States of America; 19th in order of admission into the Union; 26th in population 1880, 20th in 1890, and 19th in 1900; in 1902 2d in flaxseed, 1st in spring wheat, 4th in oats, 3d in barley, 5th in cattle, 8th in horses, 26th in sheep, 11th in swine, and 7th in oats and acreage of grass mown; 10th in railroad mileage. The name, from the Minnesota river, means 'water-sky-tinted.'

Location and Area.—M. is at the head of the upper Mississippi valley, lat. 43° 30′—49° 24′ n., long. 89° 39′—97° 5′ w.; bounded n. by the Dominion of Canada, the line running on the 49th parallel from the Red river of the north to the Lake of the Woods, thence n. to inclose a fragment of territory w. of the lake, and s. of its n.w. angle, thence descending s. and s.e. through the lake, down Rainy Lake river, through Rainy and other lakes, and down Pigeon river to Lake Superior; e. by Lake Superior and Wis., the line from the lake following the St. Louis river to its first rapids, then falling due s. to the St. Croix river, thence by the St. Croix to the Mississippi river, and down this river 134 m. to the s.e. corner at lat. 43° 30′; s. by Iowa; w. by Dak., the line being a due n. line from the Io. boundary to the s.e. outlet of Big Stone Lake, the head of M. river, thence through the lake, along the line of Lake Traverse, of the Bois des Sioux river to its junction with the Red river of the north, and thence by this river to the n.w. corner. The extreme length n. and s. is 380 m.; greatest breadth in the n. 337 m.; on the s. boundary 262 m.; opposite the mouth of the St. Croix 183 m.; area, 83,531 sq. m. (53,459,840 acres); greatest elevation above sea-level 1,680 ft.; extent of navigable waters, shore line of 2,746 m.; water line of 1,532 m.; river navigation about 1,200 m.

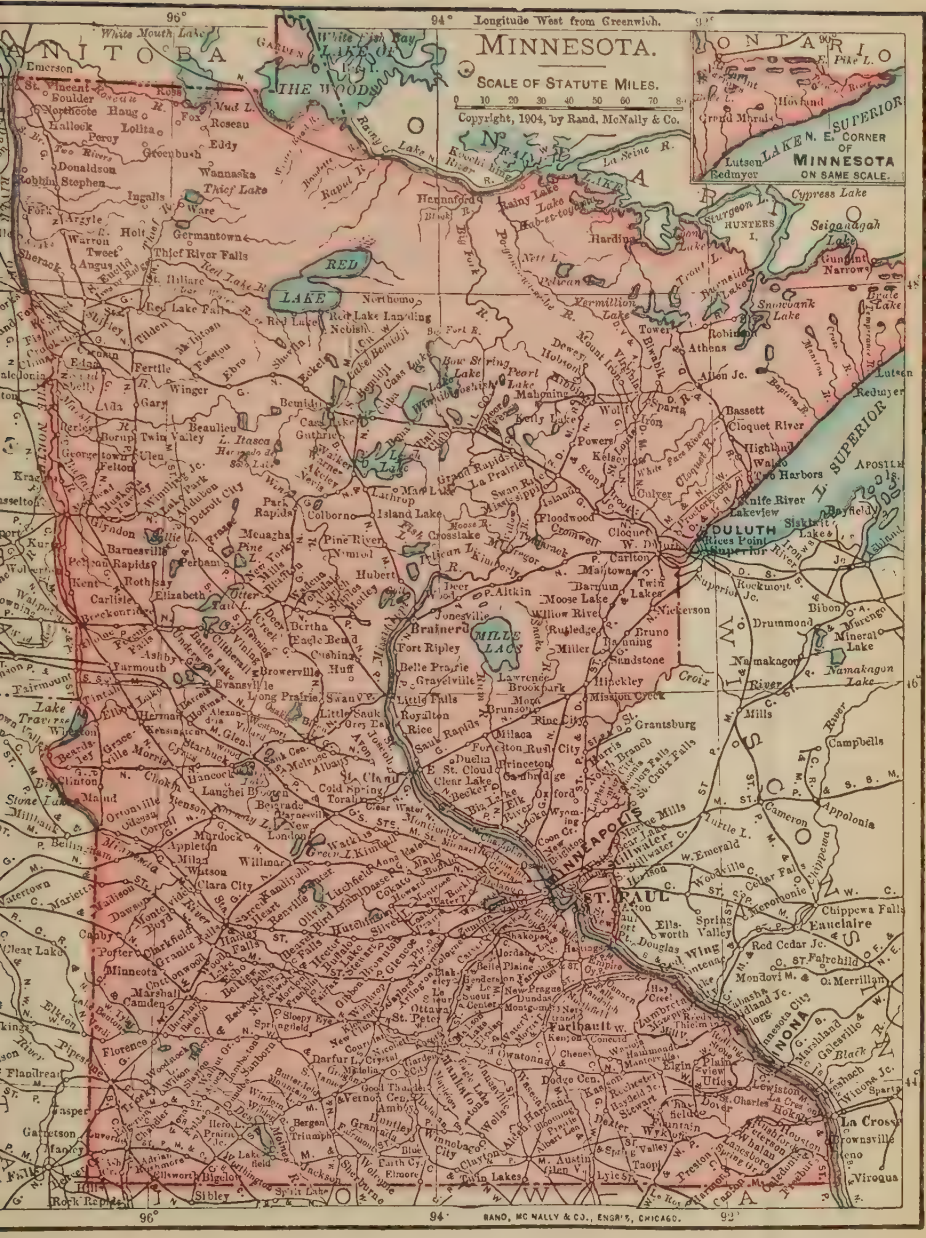
Topography.—The surface is in general an undulating plain, averaging about 1,000 ft. elevation above sea-level, with broken highlands in the extreme n.e. drained by tumbling streams which go n. into Rainy Lake chain or s. into Lake Superior; alluvial levels in the n.w. belonging to the Red river valley; a group of low flat-topped elevations extending across the middle of the n. part of the state and serving as the gathering-place of the head waters of the Mississippi river; and thence s., over the whole breadth of the state, a gradual slope, determining the descent of the Mississippi river, covered to about the centre of the state with the great belt of pine woods which reaches across from Lake Superior to the Red river valley; below the centre of the state, a region of rolling prairie, dotted with lakes and groves; and along the Minnesota river, from n.w. to s.e., across the s.w. corner of the state, a tract, more than 40 m. wide and 100 m. long (5,000 sq. m. in all), which forms a belt of hardwood trees, known as the Big Woods. Not only is the region of low hills and lakes, at the centre of the n. part of the state, the source of the Mississippi river

(q.v.), 797 m. of which belong to M., but the three great continental river systems, of the Mississippi, the Red river of the north, and the great lakes, and the St. Lawrence, about equally claim this continental crown of land as their place of beginning. Of the last the St. Louis river is the head, beyond the remote w. end of Lake Superior. The St. Croix river on the e., where it is a boundary for 129 m., of which 53 are navigable, and the Minnesota river, in a long loop across the s. part of the state, help to gather the vast mass of Minn. waters into the Miss., and make it from the confluence of the St. Croix a stream of the first magnitude. The Red river of the north gathers its waters in part along the upper half of the w. side of the state; and the Des Moines, for about 135 m. has its head stream in the s.w. corner of M., becoming navigable 20 m. before it passes into Iowa, on its way to give the Mississippi the waters of more than 10,000 sq. m. of that state.

The number of the lakes of M. is not less than 7,000, of all sizes, from a mile to 30 m. in diam., many of them having an area of more than 100 sq. m., and the whole aggregating a water surface, in the state, of 4,160 sq. m. Seldom marshy, their waters clear and cool, abounding in various kinds of fish, and their shores skirted with forest growth of every kind, they contribute at once to the beauty of the landscape and to the temperate and pure quality of the air of a region which is exceeded in salubrity by no part of the continent. They are largely of glacial origin, and form part of the s. fringe of the lake region of N. America.

Climate.—The central continental elevation of M. has climatic effects rarely combined. There are no superfluous spring and autumn rains, no prevalence at times of fogs and damp weather, and no injurious extremes of heat and cold. Days of hottest weather in summer are joined with nights delightfully cool, making the conditions of both vegetable and animal life ideally favorable; and the lowest cold of winter is so modified by the dryness of the air as to have no extreme severity, even for sensitive invalids, but rather an invigorating energy extremely favorable to health and activity. The average temperature, for 35 years, at St. Paul, was: for spring 45°·6; summer, 70°·6; autumn 40°·9; winter 16°·1; average of the year 44°·6. The average of the hottest week in summer is 85° to 90°; that of the coldest week of winter —10° to —20° (below zero). The average rainfall is about 25·5 in. annually, less than two in. being in winter, and about 12 in. being in summer. 70 per cent. of the yearly heat falls in the season of vegetable life; and 76 per cent. of both the rainfall and the atmospheric humidity. The prevailing winds are from the s. or s.e.

A remarkable fact of the topographical climatic position of M. is, that it appears to be but the gateway to a continental plain, extending n.w. far up to the 60th parallel, in the valley of the Peace river, its breadth reaching from 60 m. w. of Winnipeg 900 m. across to the des-


MINNESOTA.
SCALE OF STATUTE MILES.
0 10 20 30 40 50 60 70 80
Copyright, 1904, by Rand, McNally & Co.
Longitude West from Greenwich.
96°
94°
92°
MANITOBA
ONTARIO
LAKE SUPERIOR
LAKE OF THE WOODS
RED LAKE
MILLE LACS
LAKE N. E. CORNER OF MINNESOTA ON SAME SCALE.
DULUTH
MINNEAPOLIS
ST. PAUL
IOWA
WISCONSIN
RAND, McNALLY & CO., ENGR'S, CHICAGO.

ert lands next e. of the Rocky Mts., and its area of temperature and soil highly favorable to human habitation and culture; crossing the systems of the Red, Assiniboine, Saskatchewan, Athabasca, and Peace rivers, over a region prepared by the character of its lands, and the continental flow n.w. of temperate air, to make many such great breadths of culture and population as the states of Minn., Io., and Illinois.

Geology.—The rock foundations of M. are chiefly azoic or the lowest protozoic. A central zone reaches from n. of Lake Superior diagonally across and down to the s.w. corner of the state, its granitic and metamorphic rocks forming rough hills in the extreme n.e., of considerable mineral wealth, but through the rest of their field having an ample covering of clays, sand, gravel, and bowlders, of glacial origin; overlaid by a sandy loam, which is very finely ground, rich in organic matter, deep brown or black in color, and of the greatest fertility. The e. slope, from the central watershed built up by the line of azoic rocks, bears a heavy growth of pine, spruce, and other coniferous trees, the Lake Superior end of the pine timber belt covering nearly a third of the state, but it has a comparatively sterile soil. The n.w. part of the state, on the other side of the watershed, is supposed to have a cretaceous foundation, and on it lies a great depth of drift and alluvium of the highest value for grain and grass, and for forests of oak, beech, elm, and maple. S. and e. of the central zone of azoic foundations, there lies under the rolling prairies, the groves, belts of forest, and numerous lakes, a stretch of sandstone, in part Red Potsdam. The lower Magnesian limestone underlies the extreme s.e. part of the state; the Trenton limestone occupies a large field in the s. and s.e., a valuable breath of it underlying the cities and vicinity of St. Paul and Minneapolis; and other limestones and sandstones crop out in the bluffs of the Mississippi and the banks of the Minnesota rivers.

Zoology.—The prairies and forests of M. were abundant in elk, deer, antelopes, bears, gray and prairie wolves, wild cats, foxes, raccoons, rabbits, squirrels, gophers, and woodchucks. Of aquatic animals the beaver, otter, mink, and musk-rats abounded. Grouse, wild turkeys, partridges, pigeons, quail, plover, larks, bald and golden eagles, hawks, buzzards, owls, etc., were very numerous; also wild geese, wild ducks, brant, pelicans, teal, loons, etc.; and a great variety of song and plumage birds. A partial list of birds counts 281 species; and of winter birds 52 species have been counted, 23 of which are permanent residents. In the numerous waters belong pickerel, pike, bass, sun-fish, white-fish, trout, etc.; and through a fish commission many waters have been stocked with black bass, lake and brook trout, lake white-fish, etc. During 1885 and 6 the commission distributed in the waters of the state 22,813,147 fish, and 14,100,000 eggs, including the most

desirable species of food-fishes adapted to the lakes and streams.

Farming and Agricultural Products.—Minnesota is the tenth state in the Union in area. There are in the state 155,000 farms aggregating 27,000,000 acres, of which about 20,000,000 is improved lands. Thousands of acres of swamp land, worth $2 an acre, have been reclaimed by the ditch-work system perfected by the State Drainage Commission and are worth today $10 an acre. This work is in its infancy as yet, and consequently thousands of acres remain to be reclaimed to agricultural purposes. The total value of all the farm property in the state is $800,000,000, of which live stock and farm equipment represent about $125,000,000. Wheat is the most important single crop in Minnesota. Over half of the state's acreage is in wheat. The wheat crop of 1906 was 55,801,591 bushels, valued at $36,271,034. Minnesota raises one-fifth of all the barley raised in the country and ranks second among barley producing states, with an average crop of 30,000,000 bushels annually. Minnesota produces 75,000,000 to 90,000,000 bushels of oats and 15,000,000 bushels of potatoes annually, ranking fourth in oat production and ninth in potato production. In 1906 the principal crops were as follows: Corn, 50,149,277 bushels, valued at $17,050,754; wheat, 55,801,591 bushels, valued at $36,271,034; oats, 72,011,160 bushels, valued at $19,443,013; barley, 31,591,420 bushels, valued at $11,056,997; rye, 1,707,046 bushels, valued at $853,523; potatoes, 12,123,944 bushels, valued at $4,485,850; and hay, 1,459,390 tons, valued at $8,026,645. As an adjunct of the purely agricultural products of the state the creamery interest is one of the great industries of the state. There are in the state 700 creameries which are supplied by 54,000 farmers, who milk 420,000 cows. These creameries buy 1,500,000,000 pounds of milk every year, and make 76,000,000 pounds of butter yearly, which is sold for $18,000,000, of which amount $13,000,000 is paid to the patrons. The total dairy product of Minnesota is $35,000,000 yearly. In 1907 the farm annuals comprised 723,141 horses valued at $70,260,365; 8,657 mules valued at $816,090; 1,019,700 milch cows valued at $29,571,300; 1,305,000 other cattle valued at $17,460,900; 436,593 sheep valued at $1,744,626; and 1,377,000 swine valued at $12,393,000.

Manufacturing.—The manufactures of Minnesota are well known. Most important of these is flour and grist milling. In this industry there were in 1900 512 establishments with 4,086 employes, and with products valued at $83,877,709. In 1821 a saw-mill, the first manufactory in Minnesota, was built on the west side of the falls of St. Anthony. In 1823 it was fitted for the grinding of flour. A second mill was built in 1843, but for some time the development of the flour and grist milling industry was very slow. About 1870 the 'low grinding' process,

by which the wheat was reduced to flour in one operation, began to give place to the new 'milling,' in which a number of distinct operations were employed. The falls of St. Anthony offered superior power facilities, and the millers in that section found a market for their products at profits not elsewhere realized. In 1900 Minnesota had 11 per cent. of the total capital invested in the United States in flouring and grist mill products, and in this respect was first among the states.

In 1905 there were 4,756 manufacturing establishments, capitalized at $184,903,271, employing 69,636 wage earners, whose wages aggregated $35,843,145, using materials valued at $210,553,949, and turning out products to the value of $307,858,073. The leading industries, with the value of their products, were as follows: Flour and grist mill products, $122,059,123; lumber and timber products, $33,183,309; slaughtering and meat packing, $17,526,707; cheese, butter and condensed milk, $12,871,129; printing and publishing, $11,105,358; planing mill products, $7,949,212; railroad cars, etc., $7,379,627; and linseed oil, $7,018,234.

Mines and Mining.—The larger part of the iron ore of the United States is furnished by the Lake Superior region, originally restricted to Michigan only, but now including Michigan, Wisconsin, and Minnesota. Minnesota has now surpassed the two other states. In 1902, the output of ore for the Lake Superior region was 26,977,404 long tons, representing 76 per cent. of the total quantity reported for the United States. This region includes five ranges—the Marquette, Menominee, Gogebic, Mesabi and Vermilion. The Marquette range is in Michigan, the Menominee and Gogebic are partly in Michigan, partly in Wisconsin; and the Mesabi and Vermilion are in Minnesota. The first three mentioned were opened in 1854, 1877, and 1884, respectively. The Mesabi dates from 1892, the Vermilion from 1884. In 1904, the report of the United States Geological Survey for the calendar year of 1902 on the 'Mineral Resources of the United States' stated that to the close of 1902 the Vermilion range had shipped a total of 19,061,506 long tons, the Mesabi 53,747,807 long tons. In 1902, the output of the Vermilion was 2,057,532 long tons, that of the Mesabi 13,080,118 long tons. This latter output was nearly one-half of the total for the Lake Superior region, as given above, and was 37 per cent. of the total for the United States. The Vermilion ranked fifth among the ranges. The 15,137,650 long tons, constituting the output of the Vermilion and Mesabi ranges, were valued at $23,989,227, an average of $1.58 per ton. This represented an increase of 4,028,113 long tons over the output for 1901, or 36 per cent. It is a larger amount than was mined in the entire United States prior to 1890. The mines at present developed in Minnesota are all in the Vermilion and Mesabi ranges. The chief points of shipment are the

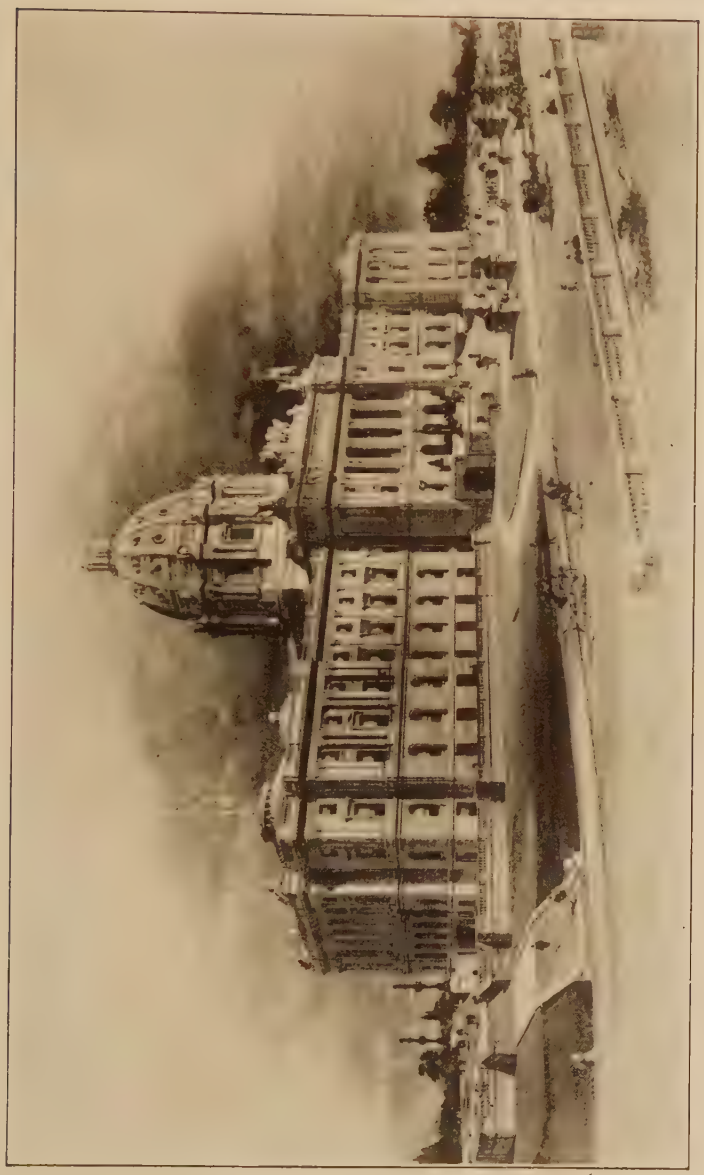
ports of Two Harbors and Duluth in Minnesota, and Superior in Wisconsin. According to an estimate compiled early in 1904, the output for 1903 showed a decline both for the Lake Superior region and for the Vermilion and Mesabi ranges.

Education.—There are in the state 8,800 public schoolhouses, valued at $18,000,000. There are 430,000 pupils, and 13,320 teachers, who draw in salaries $5,251,803; and the total expenditures were $8,469,902. There are 164 public high schools, 29 private secondary schools, 6 normal schools (Winona, Mankato, St. Cloud, Moorhead, Duluth, and St. Paul), 9 coeducational colleges and universities and colleges for men only, 8 theological schools, 2 law schools, 2 medical schools, and other technical schools. The chief universities are the University of Minnesota, Minneapolis; St. John's University, Collegeville; Augsburg Seminary, Minneapolis; Carleton College, and St. Olaf College, Northfield; Hamline University, and Macalester College, St. Paul; Gustavus Augustus College, St. Peter; and Parker College, Winnebago City. The State University ranks third in point of enrolment among the universities of the country. The State Agricultural College ranks first among all the schools of this kind in America, and foreign governments send representatives to the Minnesota Agricultural School for special training.

Penal and Charitable Institutions.—There are five insane hospitals, a school for the blind, a school for the deaf, a school for the feeble-minded, a state public school for dependent children, a state training school, a state reformatory and a state prison. These institutions are under the supervision of the state board of control. These institutions cover 5,400 acres of land, and the total value of their property is $5,600,000. The annual gross expenditures for these institutions is $1,200,000. The total number of inmates is 6,700, of which 4,000 are in the insane asylums; 90 in the school for the blind; 275 in the school for the deaf; 900 in the school for the feeble-minded; 260 in the school for dependent children; 400 in the state training school; 200 in the state reformatory and 600 in the state prison. The various state institutions produce annually $125,000 worth of farm and garden produce for their own use and for sale. The feature of the state prison is the twine plant, which manufactures 9,000,000 pounds of twine yearly. The twine is sold to the farmers of Minnesota at cost, or about two cents under the market value of twine.

Railroads.—Thirty-three railway companies, inclusive of six terminal corporations, have trackage in Minnesota, the total mileage being 8,064.09. There were also 7 lines of electric railway operating 413 miles of track.

Finances.—The total assessed valuation of Minnesota is $1,037,017,413; the total bonded indebtedness of the state less than one million dollars. In 1908, there were



STATE CAPITOL AT ST. PAUL.

261 national banks in operation in the state, with total resources of $196,504,537.52; capital stock paid in $20,-666,000; surplus $11,193,959.92; and individual deposits of $108,230,687.27. There are 466 state banks, with total resources of $89,123,417; capital stock $10,686,600; surplus $3,096,268; deposits $68,488,511. There are 5 loan and trust companies, with total resources of $4,520,468; capital stock $1,450,000; surplus $385,762; and deposits $2,104,352. An act of the legislature passed in 1907, Apr., abolished private banks after 1908, Apr. 1. In 1907, there were 117 of these banks, with resources of $9,510,698; capital of $2,426,116; deposits $6,575,000. There are also 14 savings banks, with resources of $25,-276,730, and deposits of $24,028,724.

Political.—St. Paul is the capital. Under a territorial agreement by which that city became the seat of government, Minneapolis secured the university and Stillwater the state prison. The state has completed a handsome capitol which, with its parks and approaches, cost approximately $5,000,000. The reapportionment of 1901 gave Minnesota nine congressional districts and eleven votes in the electoral college. For legislative purposes, the state is divided into 63 senatorial districts, electing an equal number of senators, for four year terms, and 119 members of the house of representatives, for two year terms. Minnesota is recognized as an impregnable republican state. But three times since its organization has it chosen a democratic governor, upon which occasion local issues controlled the result. The state gave 161,000 republican plurality in the presidential election of 1904.

History.—Jesuit accounts, as early as 1670-71, refer to the Indians of the region, Sioux or Dakotas, and Du Luth led the first trading expedition toward the Mississippi 1678, and later reached the great river by canoe passage from Lake Superior. Father Louis Hennepin, 1680, visited and named the falls of St. Anthony, and gave the first published report to the world. Perrot, a fur trader, came by the way of Fox and Wisconsin rivers to the Mississippi 1684, and founded the first trading-post, at Lake Pepin. Le Sueur ascended the Mississippi river to St. Anthony's falls 1700, and started a second trading-post. In 1763, English possession succeeded to French; and 1766 Carver entered on exploration of the upper Mississippi country. In 1783, Great Britain nominally yielded possession to the United States, and by the ordinance of 1787 all of Minnesota e. of the Mississippi was included in the n.w. territory, and under this should have become part of Wisconsin. In 1804, all of Minnesota w. of the Mississippi became the n. end of upper Louisiana (with the present Iowa, Missouri, Arkansas). It was from 1812 that the United States first had control of the region. Fort Snelling was established 1821, and St. Paul dates from 1846. A bill to organize the territory was introduced in and passed by congress 1849, Mar. 3,

when the pop. was but 4,057. In 1837 the cession had been made by the Indians of a small tract between the St. Croix and the Mississippi, and 1851 the Sioux ceded all the land w. of the Mississippi as far as to the Big-Sioux river. 1857, Feb. 26, the enabling act for admitting the terr. into the union was passed, and 1858, May 11, M. became a state, the 32d of the United States, with a population of 150,037. As late as 1862 the Indians made an onslaught, over a large part of the state, upon the scattered settlements, massacred more than 700 people, took away captive 200, chiefly women, ravaged 30 cos., made 30,000 people homeless, and destroyed $3,000,000 worth of property. The civil war 1860–65 drew out of the state 25,052 men, nearly one-seventh its pop. in 1860. But rapid growth repaired all losses. The census of 1865 (under state law) showed a pop. of 250,099. Railroad construction had been early begun, and was energetically pushed. It occasioned a difficulty in the matter of bonds issued in aid of companies which failed, but this was ultimately settled satisfactorily, while the state had meanwhile grown immensely in pop., wealth, and every element of prosperity and greatness.

Government.—The state constitution was adopted 1857, Oct. 13, and the government organized 1858, May. The state administration consists of a gov., elected to serve two years; lieut.-gov.; sec. of state; treas.; and attor.-gen. Her votes for pres. and vice-pres. have been as follows: 1860, Abraham Lincoln and Hannibal Hamlin; 1864, Abraham Lincoln and Andrew Johnson; 1868, U. S. Grant and Schuyler Colfax; 1872, U. S. Grant and Henry Wilson; 1876, Rutherford B. Hayes and William A. Wheeler, 5; 1880, James A. Garfield and Chester A. Arthur; 1884, James G. Blaine and John A. Logan, 7; 1888, Benjamin Harrison and Levi P. Morton; 1892, Benjamin Harrison and Whitelaw Reid; 1896, William McKinley and Garret A. Hobart 9; 1900, William McKinley and Theodore Roosevelt; 1904, Theodore Roosevelt and Charles W. Fairbanks; 1908, W. H. Taft and J. S. Sherman.

Population.—(1860) 172,023; (1870) 439,706; (1880) 780,773; (1890) 1,301,826; (1900) 1,751,394.

Bibliography.—Flandrau, *The History of Minnesota* (1900); Neill, *The History of Minnesota.*

MINNESOTA, THE UNIVERSITY OF: a state institution at the head of the system of public education in Minnesota, located in Minneapolis, on the e. bank of the Mississippi river. Its grounds comprise about 50 acres, and are so situated as to command a good view of the Falls of St. Anthony and of the Mississippi river. The University farm, belonging to the State School of Agriculture contains 250 acres and is three miles distant from the University. The charter of the University was granted by the territorial legislature 1851, 13 Feb., when the territory contained less than

10,000 inhabitants. The state constitution, adopted 1857, 13 Oct., confirmed to the University all rights previously granted to it by the legislature. The institution was organized as a college in 1869, and opened 15 Sept., 1869, with a faculty of nine professors. William W. Folwell, LL.D., a graduate of Hobart College, was its first president and filled the office till 1884. Cyrus Northrop, LL.D., a graduate of Yale University and for 21 years a professor in Yale, was elected president in 1884.

The University consists of the following departments: (1) the College of Science, Literature and Arts; (2) the College of Engineering and Mechanic Arts; (3) the College of Agriculture; (4) the College of Law; (5) the College of Medicine and Surgery; (6) the College of Homœopathic Medicine and Surgery; (7) the College of Dentistry; (8) the College of Pharmacy; (9) the School of Mines; (10) the School of Chemistry; (11) the School of Agriculture; (12) the Graduate Department. The management of the University is vested in a board of 12 regents, of whom the governor of the state, the president of the University, and the state superintendent of public instruction are ex-officio members, and nine others are appointed by the governor and confirmed by the senate. The financial affairs of the University, except the salaries of instructors, are regulated by an act of the legislature passed in 1901, subject to the approval of the state board of control. The real estate, land and buildings of the University are valued at about $2,000,000, and its invested fund is about $1,400,000. The total attendance of students in 1903 was 3,788, of whom 1,179 were women. The number of professors and instructors is about 300. There are 18 buildings on the University campus, and 13 buildings on the farm, with which the School of Agriculture and the experiment station are connected.

The University is supported by the state. Its fees required of students are nominal, except in the professional schools. One of the finest buildings on the campus is the gift of the late ex-Governor John S. Pillsbury, who was for many years president of the board of regents, and to whose never-failing devotion the institution is largely indebted for its prosperity. The library contains 110,000 volumes. The requirements for admission are a full four years' course in a high school or its equivalent. Candidates for admission to the College of Medicine and Surgery are required to have completed, in addition to a high school course, two years in the University or some other reputable college. A special six years' course has been provided by which both the degrees of B.A. and M.D. may be obtained—the first two years being in the College of Science, Literature and Arts, with a select course of studies; and the last four years being the regular course in medicine.

MINNESO'TA (or ST. PETER'S) RIVER: rising near the n.e. boundary of S. Dakota, flowing s.e. 300 m. to South Bend, then n.e. 120 m., and emptying into the Mississippi at Mendota. It is navigable 40 m. by steamboats.

MINNETONKA, *mĭn-ē-tŏn'ka*, LAKE: popular summer and fishing resort in the 'Big Woods' of Minn.: on the Pacific branch of the Minneapolis and St. Louis railroad: 15 m. s.w. of Minneapolis, 25 m. s.w. of St. Paul. It has communications with both cities by 6 regular trains each way during the summer. It covers about 16,000 acres, broken into 25 bays, and has an irregular shore-line of about 200 m. The bays are connected by narrow navigable inlets, and the banks and numerous islands are covered with maple, oak, basswood, elm and other forest trees. There are three villages on the lake: Excelsior on the s. shore; Waysata on the n ; and Mound City at the extreme end of Upper Lake. The large hotel which formerly accommodated transient summer guests was recently burnt down; many pretty and costly cottages have been erected along the lake by citizens of Minneapolis and St. Paul.

MINNEWASKA, LAKE: deep and clear lake, about three-quarters of a m. long, ¼ m. wide, held inclosed as in a rocky bowl on the summit of the Shawangunk Mts., Ulster co., N. Y.; 1,800 ft. above sea-level; 10 m. s.w. of New Paltz on Walkill Valley r.r.; 19 m. w. of the Hudson at Poughkeepsie, 98 m. n. of New York. The rock-formations here are very striking, the scenery is picturesque, and the air invigorating: these, with excellent hotels, make it a favorite summer-resort. Mohonk Lake is 9 m. distant.

MINNEWAUKAU, *mĭn'ē-waw-kaw'*, LAKE [Indian, Lake of the Great Spirit, Waukau] (formerly known as DEVIL'S LAKE): remarkable body of salt water in Ramsey and Benson cos., N. D.; 55 m. long and 3–10 m. wide.

MINNOW, n. *mĭn'nō* [Gael. *miniasg*, a minnow—from *mion*, small, and *iasg*, a fish; *meanbh*, little, small: F. *menu*, small: L. *minĭmum*, the least], (*Leuciscus phoxinus*): very small fish of same genus with the roach, dace, chub, etc., of a more rounded form than most of its congeners, a common native of streams with gravelly bottoms in most parts of Britain. It seldom exceeds three inches in length, the head and back of dusky olive color, the sides lighter and mottled, the belly white, or, in summer, pink. Minnows swim in shoals, feed readily either on animal or vegetable substances, if sufficiently soft, and are said to be very destructive to the spawn of salmon and of trout. The M. is a fish of very pleasant flavor. A casting-net affords the means of taking it in sufficient abundance. It is favorite bait for pike and trout. Several other fishes are called M. in N. Amer.

MINO BIRD: see MINA BIRD.

MINOR, *mēnŏr*, JAKOB, Austrian scholar: b. Vienna 1855, April 15. He was educated at Vienna and Berlin, and became professor of German language and literature at Prague (1884) and of Teutonic philology at Vienna. Besides numerous editions of texts, he published *Neuhochdeutsche Metrik* (1893), an excellent study in prosody, and a valuable incomplete work on Schiller (2 vols. 1890).

MINOR, *mīnŏr*, ROBERT CRANNELL, American painter: b. New York 1840; d. 1904. He studied at Barbizon and became a pupil of Diaz there. He subsequently went to Antwerp and was taught by Van Luppen and Boulanger, making a specialty of landscape. He exhibited in the salons of Antwerp and Paris, in the Royal Academy of London, as well as in New York, Boston and Chicago. Among his best known works are: *Dawn; Sundown; The Stream; October Days; Morning in June; Sunrise on Lake Champlain; Cradle of the Hudson;* and *A Mountain Path.*

MINOR, VIRGINIA LOUISA, American reformer: b. Groochland county, Va., 1824, March 27. She was educated at Charlottesville Academy (Va.), and in 1843 was married to a relative, Francis Minor, with whom she removed to St. Louis, Mo., in 1846. She was engaged in nursing the soldiers during the Civil War, and since the war has been connected with woman's suffrage movements. She was the originator of the movement in Missouri in 1866, organized an association in 1867, and was president of the convention which met in St. Louis in 1869. In 1872 she brought the question of woman's suffrage as a right before the Supreme Court of the United States, where decision was rendered against her.

MINOR, a. *mī'nĕr* [L. *minor*, less: comp. AS. and Ir. *min*, small: Icel. *minnr*, less] less; smaller; inconsiderable; petty; unimportant; in *music* (see below): N. a person under age; one under 20 years; in Scotch *law*, a male person between the ages of 14 and 21 years, and a female person between 12 and 21 (see INFANT: RESTITUTION: GUARDIAN): in *logic*, the second proposition of a regular syllogism, called the *minor term*. MINORITY, n. *mī-nŏr'ĭ-tĭ*, the period from birth till 21 years of age; the smaller number, as distinguished from the *majority*. MINOR KEY in *music*, a key that takes a minor third; that arrangement of tones and semitones in a piece of music, often considered appropriate for solemn and mournful subjects (see MINOR in MUSIC, below). MINOR CANONS, priests in certain of the cathedrals who rank next to the canons, and are responsible for the daily service. MINORITES, n. plu. *mĭn'ŏr-īts* [L. *Frātrēs minōrēs*, the Lesser Brothers]: a name of the Franciscan order of friars, which has left its trace in the popular designation of several places in English and other European cities. See FRANCISCANS. MI'NOR-PLAN'ET, n. in *astron.*, an asteroid, or planetoid.

MI'NOR: term used in music. 1. In the nomenclature of intervals. The interval between any note and another is named according to the number of degrees between them on the scale, both notes included. The interval between C and E is called a third; that between E and G also is a third; but these intervals are unequal, the one consisting of four semitones, the other of three; the former is therefore distinguished as a major, the latter as a minor interval. 2. M. is applied also to one of the two modes in which a musical passage may be composed, which is then said to be in the M. key. The scale of the M. mode differs from that of the major mode in the third of its key-note being a M. instead of a major third. See MUSIC: MODE, in Music.

MINOR BARONS: inferior class of barons, in England under the feudal system from the Conquest (1066) to near the close of the reign of Henry III. (about 1265), who held lands under military tenure not from the sovereign but from the principal barons. The word baron, in the earliest period of feudalism, signified one who held lands of a superior by military tenure. The superior might be the sovereign, or he might be an earl or other eminent person, who held of the sovereign. According as he was the sovereign on one hand, or an earl on the other, the baron holding under him was, in the earliest sense of the distinction, a greater or minor baron. At the Conquest, a large part of the soil of England was parcelled by William the Norman among his military retainers, who were bound in return to perform services, to do homage, and to assist in administering justice, and in transacting the other business done in the court of the king. 400 of these tenants-in-chief of the crown are enumerated in Domesday (q.v.), including among them 'vicecomites' and 'comites,' who together constituted the body of men called the Barons of England. As the sovereign was entitled to demand from the barons military service, homage, and attendance in the courts, so, many of the principal barons, particularly such of them as were earls, had military tenants, from whom they in turn received homage and assistance in administering justice in their baronial courts. These tenants were barons of the barons, or, in the earliest sense, minor barons; but by the usage of England, from the Conquest downward, they were seldom called barons, that term having been generally restricted to the former class, the holders of land direct from the crown, who were next to the king in dignity, formed his army and his legislative assembly, and obtained the Great Charter from King John. The subinfeudation which produced the minor barons was checked by a statute of Edward I., directing that all persons acquiring lands from a subject should hold, not of that subject, but of his superior.

Out of the 'commune concilium' of the king, at which all his barons were bound to attend, arose the parliament. It is not till the close of Henry III.'s, or beginning of Edward I.'s reign that we find a select number instead

of the whole barons attending. The exact period of the change, and the way in which it was made, are still among the obscure points of English history; it has been thought that after the rebellion which was crushed at the battle of Evesham, Henry III. summoned only those barons who were most devoted to his interest. From this period, a new distinction between major and minor barons arose, the latter term being no longer applied to the barons of the barons, but to those barons of the crown who were no longer summoned by writ to parliament. The word baron was more and more used in the restricted sense of a baron of parliament, and the right or duty of attendance came in process of time to be founded, not on the land tenure, but on the writ. See HENRY III.

In Scotland, the barons (or lairds) were such persons as held their lands directly of the crown. They were the king's advisers, witnessed his charters, and possessed a civil and criminal jurisdiction. All had to give attendance in the Scottish parliament, which consisted of the earls and barons sitting together. After the reign of James I., some of the more powerful barons appear more exclusively as lords of parliament, those whose incomes were below a certain amount obtaining a dispensation from attendance: yet all possessed a right to attend parliament till 1587, when the barons not specially created lords of parliament were required, in place of personally attending, to send representatives of their order from each sheriffdom. The term baron, however, still continued in Scotland to be applied to the whole body of tenants *in capite*, such of them as were lords of parliament being distinctively major, and the others minor barons; but all continuing till 1747 to possess extensive civil jurisdiction, and a criminal jurisdiction, from which only treason and the four pleas of the crown were excluded. The representative minor barons sat in the same house with the major barons, and until the union their votes continued to be recorded as those of the 'Small Barrounis.'

MINORCA, *mĭn-awr′ka* or *mē-nōr′kâ:* largest of the Balearic Isles (q.v.), after Majorca, from which it is distant 25 m. n.east. It is 31 m. long, 13 m. in greatest breadth; 284 sq. m. Its coast, broken into numerous bays and inlets, is fringed with islets and shoals, and its surface, less mountainous than that of Majorca, is undulating, rising to its highest point in Mount Toro, 4,793 ft. above sea-level. Its productions are similar to those of Majorca, though it is neither so fertile in soil nor so well watered. The chief towns are Port Mahon (q.v.), and Ciudadela. The annual exports are worth $550,000; imports, $500,000. Pop. about 40,000.

MINOS, *mī′nos:* name of two mythological kings of Crete. The first is said to have been the son of Jupiter and Europa, and brother of Rhadamanthus, and father of Deucalion and Ariadne, and, after his death, a judge in the infernal regions.—The second of the same name was

grandson of the former, and son of Lycastus and Ida. To him the celebrated *Laws of Minos* are ascribed, in which he is said to have received instruction from Jupiter. He was the husband of that Pasiphaë who gave birth to the Minotaur (q.v.).—Homer and Hesiod know of only one Minos, King of Cnossus, and son and friend of Jupiter.

MINOT, *mī'nŏt,* CHARLES SEDGWICK, S.D., LL.D.: American scientist: b. West Roxbury, Mass., 1852, Dec. 23. He was graduated from the Massachusetts Institute of Technology in 1872, studied also at Leipsic, Paris, Würzburg, and Harvard; was lecturer on embryology and instructor in oral pathology and surgery in the Harvard Medical School in 1880-3, instructor in histology and embryology in 1883-7, assistant professor in 1887-92, professor from 1892-1905, and since 1905 James Stillman professor of comparative anatomy. He invented two forms of the microtome, an instrument for the automatic preparation of sections for microscopical study. He was elected president of the American Society of Naturalists in 1894, and president of the biological section of the American Association for the Advancement of Science in 1901. Among his works are: *Bibliography of Vertebrate Embryology* (1893); and *A Laboratory Text-Book of Embryology* (1903).

MINOTAUR, n. *mĭn'ō-tawr* [Gr. *minōtau'rŏs;* L. *minotau'rus*—from *Mĭnōs,* Minos; Gr. *tauros,* a bull]: in *anc. myth.,* a monster with the head of a bull and the body of a man; one of the most repulsive conceptions of early Grecian mythology. He is represented as the son of Pasiphaë and a bull for which she had conceived a passion. Minos (q.v.), the husband of Pasiphaë, shut him up in the Cnossian Labyrinth, and there fed him with youths and maidens, whom Athens was obliged to supply as an annual tribute, till Theseus, with the help of Ariadne (q.v.), slew the monster. The minotaur is, with some probability, regarded as a symbol of the Phœnician sun-god, Melkarth, with whose worship the bull-worship was cognate.

MINOT'S LEDGE LIGHT-HOUSE, *mī'nots:* noted structure on a projecting point of the Mass. coast, about 8 m. e.s.e. of Boston light, where the ledge of Cohasset is most dangerous to vessels coming into Boston harbor. The rock is 1½ m. off shore, with barely a circle of 25 ft. uncovered at low tide. It was a ledge most difficult to build on. By an act of congress 1847, the first lighthouse was erected, with an octagon base, of which each side was 9½ ft., and the distance across 25 ft. Iron piles of 10 in. diam. were set 5 ft. into the rock, at each angle of the octagon, and in the centre; and firmly braced and tied with wrought-iron braces. At 55 ft. above the rock the piles were fixed securely into a heavy casting, and above this was constructed the keeper's dwelling,

surmounted by the light. The structure was finished 1849; and 1851, Apr., was destroyed by one of the worst storms ever known on that coast. By act of congress 1852, a plan, approved by the secretary of the treasury 1855, was adopted for a new structure, to be a granite tower, in the shape of the frustum of a cone. The base is 30 ft. in diam.; 40 ft. are built up solid, with the courses securely tied by galvanized wrought-iron dowels, 3 in. in diam., and the stones of each course dovetailed. From early in 1855 to the end of 1857 was consumed in preparing the rock and laying 4 stones. Six courses were laid 1858, and the solid 40 ft. completed 1859, with 20 ft. of the house above. It was finished, and the light in use, by the end of 1860.

MINSK, *mĭnsk:* government and province of W. or White Russia, s.e. of Wilna; 34,860 sq.m. The people are chiefly Russians, Lithuanians, Poles, and Jews, with a small percentage of Tartars and gypsies. Five-sevenths of the population profess the Greek religion. The chief exports are timber, salt, and corn, brought by river-carriage to the Baltic and Black Sea ports. The principal manufactures are fine cloths, linen, and sugar. The soil is not fertile, and woods and marshes, with sandy wastes abound. Cattle and sheep breeding are carried on. The inhabitants of the s. or marshy portion of the province are subject to that dreadful disease, the *Plica Polonica* (q.v.). Pop. 2,156,123.

MINSK: chief town of the govt. of Minsk; on the Svislocz, an affluent of the Beresina, 465 m. by rail w. of Moscow. It is built mostly of wood, but has many handsome stone edifices, among which are the Greek and Rom. Cath. cathedrals and seminaries, the Church of St. Catharine, a number of educational and philanthropic establishments, a public library, and a theatre. The chief manufactures are woolen cloth and leather. Pop. 91,494.

MINSTER, n. *mĭn'stĕr* [AS. *mynstre;* OF. *monstier*—from mid. L. *monastĕrĭŭm,* a monastery, then the church attached to it]: the church of a monastery or convent; a cathedral church. See MONASTERY.

MINSTREL, n. *mĭn'strĕl* [OF. *menestrel,* a workman, a minstrel—from mid. L. *ministrālis,* an artisan, a servant—from mid. L. *ministĕrĭŭm;* F. *ministère,* occupation, an art]: in the *middle ages,* one of a body of men whose profession it was to administer their skill in poetry and music by recounting heroic deeds in verse, often composed by themselves, and to sing them to the harp; a national poet who writes poetry recounting the heroic deeds of the past; a portrayer in verse of national deeds and character, and of home life in the past; a musician. MINSTRELSY, n. *mĭn'strĕl-sĭ,* the art or occupation of a minstrel; system of ballads restricted to certain events, or to a certain age; music, generally instrumental; a number of musicians.—*Minstrels,* usually strollers, often

accompanying their song with mimicry and gesture, were exceedingly popular, supplying a rude entertainment suited to the taste of the times. Their songs were mostly martial, tending to cultivate a heroic spirit accordant with the chivalry of the middle ages. In general, they correspond in England to the earlier Bards (q.v.) of Wales, Ireland, and Scotland, though as a class much inferior. In the reign of Richard I. they were at their height of privilege: the king, himself a minstrel, gathered them in numbers to his court, with Troubadours (q.v.) from France, and gave them honors and rewards. From the time of Edward IV., the order declined, and in the time of Elizabeth, minstrels were by law classed with jugglers and peddlers, as vagabonds and beggars. Of far higher grade were the Troubadours (q.v.) and Trouvéres (q.v.), who sang mostly of love, and in other respects differed from the minstrels. See also NEGRO MINSTRELSY.

MINT, n. *mĭnt* [Dut. *munte;* Ger. *münze*—from L. *monētă,* money, the stamp with which it was struck: Dut. *munten,* to mint, to strike money]: place where money is coined by authority of government: figuratively, a source of abundant supply; a place in which something is invented: V. to coin; to invent or fabricate. MINT'ING, imp. MINT'ED, pp. coined. MINTAGE, n. *mĭnt'āj,* that which is coined or stamped; duty paid for coining.

MINT: an establishment where metals are converted into coins; now generally a government institution. The final processes are described under COINAGE; but a number of antecedent ones require explanation. Generally speaking, the precious metals in their natural state are not pure and the foreign elements must be separated in order to fit them for coinage. This is done by *melting and refining.* The former process eliminates a very large part of the inferior metals by combination; the latter, by means of acids or electrical methods, parts what may remain, particularly the silver from the gold; these two last named metals being almost invariably found in combination.

In order not to burden the mints with too great a task in this particular, the laws generally provide that, in order to be acceptable, precious metals must be of a minimum degree of purity or *fineness;* thus metal under .600 fine, or three-fifths pure, may be rejected in the United States mint offices. Private smelting and refining establishments exist for the 'reduction' of such ores and bullion; and the greater part of the gold and silver produced is in fact refined in these. Mints also accept bullion in other than natural forms; coins, jewelry, plate, etc., which are duly melted down for the purpose.

Since the acquisition of precious metals is most desirable, governments usually provide liberal regulations to attract sellers thereof. The formerly existing heavy charges for melting and coining have been reduced to a

minimum, some abolished altogether. In theory the owner of bullion brings it to the mint for coinage, and when, in its turn, it has been converted receives the resulting pieces; in fact, however, any coin serves his purpose equally well, and generally he is paid from any coin which the mint may have on hand, or by check upon the government's treasury. Yet the mints reserve the right to a short delay, partly in order to assure themselves of the character of the metal.

In the United States the procedure is substantially as follows: Small tenders of bullion are usually paid for at once at an approximate valuation, readily determined by weighing; larger deposits are paid for to the extent of 90 per cent. of the value indicated, when the fineness of the metal can be approximated; other tenders must await the actual determination of value after melting and *assaying*, which latter term designates the process of ascertaining the fineness of the metal. Gold is paid for at the fixed rate of $20.67½ per fine ounce; silver at about the market value for the day; but except when needed for coinage, only that silver is bought which is found in gold deposits.

A receipt is given the depositor stating the ascertained weight of the bullion. Each deposit of substantial quantity is treated separately. The bullion, or coin, is placed in a crucible, or melting pot, and subjected to sufficient furnace heat to render it fluid; by skillful manipulation almost all of the foreign substances are eliminated and the mass is kept homogeneous. The contents of the crucible are then poured into moulds and bars are cast; from each of these, small quantities are taken from the ends and from the middle to obtain a fair sample of the mass, and delivered to the assayer. If the bar be found not homogeneous—the same fineness throughout—it must be again subjected to the melting; otherwise it is passed and paid for. But since our standard fineness for coinage is .900, a charge is made for refining in case the bar is below the standard, and for the copper needed to alloy it if it prove higher than the standard; also for parting the silver from the gold. Accurate records are kept of each melt, every bar being stamped with a number, the weight and the fineness.

To bring a lot of bars to the legal standard they are classified and assorted according to fineness and prepared for the refining and parting processes. To facilitate the operations it is found desirable that the proportion of silver and gold in the mass be not less than 2½ to 1; if requisite, silver is added. Copper in the mass is not a deterrent. This is then again melted (in about 4,000 oz. lots) and when thoroughly fused and mixed is poured with ladles into cold water in tanks in such a manner as to produce globules about the size of pop-corn. These are then placed in jars of nitric acid and boiled; being in small particles the acid works upon the metal more

effectively; its affinity for silver and the other metals and its lack of affinity for gold causes the parting; the gold being heaviest falls to the bottom; this sediment is washed in water and is practically pure gold.

The liquid solution contains the silver; it is drawn off and combined with salt water, the chlorine in which separates the silver, forming a chloride, which also settles at the bottom; the remaining liquid is filtered off; hot water, granulated zinc and sulphuric acid are added to the chloride and these free the silver.

Instead of this nitric acid process sulphuric acid is frequently used; the metal combination differs somewhat but in general the operation is similar, except that copper is used to precipitate the silver. The electrolytic process, a recent invention, is used generally in private refineries, but recently also introduced in the Denver mint of the United States. The metal is separated by means of an electric current operating in a solution of the metals and acids. While it was formerly employed chiefly for refining silver, it is now also used for gold, with excellent results, eliminating more of the foreign substances than any other process.

The granulated, almost pure, gold (or silver) resulting from the refining is then melted, cast into bars and assayed. A portion of the product is retained in this shape for industrial use and for exporters of gold, who prefer these high-grade bars. For coinage purposes sufficient pure copper is weighed out to combine with the bars in 'melts' so as to produce metal of the exact standard fineness. Great care must be exercised to get this exact and to have the metal homogeneous. An additional test in assaying is therefore applied; granules are taken from the molten metal beside the several samples from the *ingots,* or resulting bars, prepared for the coiner. If not satisfactory they are remelted and the variation corrected.

It is perhaps unnecessary to say that every bit of metal, even the minute samples taken by the assayer, are saved and accounted for as if they were money; accounts are kept of the waste, which while insignificant is yet sufficiently valuable to have made it a feature to save the sweepings of the floors, chimneys, etc., of the buildings.

Assaying is one of the most precise processes. The small samples of bullion taken from bars and ingots for the purpose are weighed upon scales so sensitive that they show the variation in weight of a piece of paper before and after a word has been penciled thereon; this is expressed in the fiftieth of a milligramme: (milligramme, 1000 gramme, gramme = 15.432 grains; hence sensitiveness is .0031 of a grain).

To the sample of gold to be treated, there is added a small quantity of silver and copper; each is duly weighed; then enclosed in a coverlet of pure lead foil, also weighed.

The combination of the metals facilitates the operation. Rolled into a small pellet this combination is placed in a *cupel* or small crucible, of very porous material (bone-ash, etc.), and subjected to intense heat in a small gas furnace. The melting which follows causes all particles of metal other than gold and silver to be eliminated or absorbed by the cupel.

The pellet of gold and silver remaining after cooling is weighed; rolled out into a very thin strip and subjected to nitric acid, which separates the silver as in the refining process; the silver being recovered by the use of salt water. Thus a quantity of granulated pure gold and silver is obtained. The proportion which these bear to the total is ascertained by weighing and calculating the differences between the resulting weights and those taken before. The result is expressed in ten-thousandths.

All of the samples are similarly tested; and unless all those taken from one bar show the same results, or within a minute fraction thereof, a further test of other samples must be made, or the bar must be remelted if differences are shown. A margin of difference, known as *tolerance*, is permitted; and this is rarely exceeded anywhere; most mints operate well within the margin, which in the United States is $\frac{1}{1000}$ for gold and $\frac{3}{1000}$ for silver.

Préparation of Dies.—The mint establishments have their own designers, engravers, and machinery for the making of dies used for coinage.

A design having been determined upon—a matter of no little importance to effect a combination of artistic and practical results—a model thereof is prepared in some soft material, by the engraver, in size several times larger than the proposed coin; from this an electrotype is made, carefully examined and finished; a reduced copy thereof, the size of the coin to be struck, is made in soft steel with a reducing lathe, operating a cutting drill, slowly and accurately. This copy is most carefully finished by the engraver, the lathe being unable to produce all of the delicate features of the design. When perfected this is hardened.

If the finished copy be *in relief* it is of course to be used as a 'hub' to transfer the design to other pieces of soft steel under great pressure; these after hardening are the coinage dies, and as duplicates are constantly required the relief method is usually employed. If duplicates are not necessary the reduction may be *intaglio*, and the die when hardened is ready for work.

In the United States there are today four mints, the original one in Philadelphia, established 1792, the one in New Orleans dating from 1838, the one in San Francisco dating from 1854, and the one recently opened at Denver. Government assay offices exist in New York, at St. Louis, Mo.; Charlotte, N. C.; Deadwood, S. D.; Helena, Mont.; Boise, Idaho; and Seattle, Wash.

MINT, n. *mĭnt* [AS. *mynte;* L. *mentha;* Gr. *minthē*, mint], (*Mentha*): genus of plants, of nat. order *Labiatæ;* with small, funnel-shaped, 4-fid, generally red corolla, and four straight stamens. The species are perennial herbaceous plants, varying considerably in appearance, but all with creeping root-stocks. The flowers are whorled, the whorls often grouped in spikes or heads. The species are widely distributed over the world. WATER M. (*M. aquatica*), grows in wet grounds and ditches. CORN M. (*M. arvensis*), is a weed in cornfields and gardens. These and most of the other species have erect stems. All the species contain an aromatic essential oil, in virtue of which they are more or less medicinal. The most important species are SPEARMINT, PEPPERMINT, and PENNYROYAL.—SPEARMINT or GREEN M. (*M. viridis*) is a native of almost all temperate parts of the globe; it has erect smooth stems, one to two ft. high, with whorls of flowers in loose cylindrical or oblong spikes at the top; leaves lanceolate, acute, smooth, serrated, destitute of stalk, or nearly so. It has a very agreeable odor.—PEPPERMINT (*M. piperita*), a plant of equally wide distribution in temperate parts of the world, is very similar to spearmint, but has the leaves stalked, and the flowers in short spikes, the lower whorls somewhat distant from the rest: it is readily recognized by the peculiar pungency of its odor and of its taste.—PENNYROYAL (*M. pulegium*) unlike the Amer. plant, has a much-branched prostrate stem, which sends down new roots as it extends in length; the leaves ovate, stalked; the flowers in distant globose whorls. Its smell resembles that of the other mints.—All these species, in a wild state, grow in ditches or wet places. All are cultivated in gardens; and peppermint largely for medicinal use and for flavoring lozenges. *Mint Sauce* is generally made of spearmint; which is used also for flavoring soups, etc. A kind of M. with lemon-scented leaves, called BERGAMOT M. (*M. citrata*), is found in parts of Europe, and elsewhere, and is cultivated in gardens. Varieties of peppermint and horse-mint (*M. sylvestris*), with *crisped* or inflato-rugose leaves, are much cultivated in Germany under the name CURLED M. (*Krause-minze*); the leaves being dried and used as a domestic medicine, and in poultices and baths. All kinds of M. are easily propagated by parting the roots or by cuttings. Most of them bloom in Aug.—Of different genera are *Monarda punctata*, also called Horse-M., and *Pycnanthemum linifolium*, also called Mountain-M.; also *Nipata Cataria*, Cat-M. or CATNIP (q.v.). It is said that mice have great aversion to M., and that a few leaves of it will keep them at a distance.

Peppermint, Pennyroyal, and Spearmint, are used in medicine. The pharmacopœias contain an *aqua*, *spiritus*, and *oleum* of each of them; the officinal part being the herb, which should be collected when in flower. *Peppermint* is a powerful diffusible stimulant, and, as such, is antispasmodic and stomachic, and is much employed in the treatment of gastrodynia and flatulent colic. It is

extensively used also in mixtures, for covering the taste of drugs. *Penny-royal* and *spearmint* are similar in their action, but inferior for all purposes to peppermint. The ordinary doses are one to two ounces of the *aqua*, a drachm of the *spiritus* (in a wine-glassful of water), and three to five drops of the *oleum* (on a lump of sugar).

MINTURN, *mĭn'tėrn*, ROBERT BOWNE: 1805, Nov. 16 —1866, Jan. 9; b. New York. At the age of 14 he entered a counting-house, but applied his spare moments to literary studies. In 1825 he formed a partnership with Charles Green; in 1830 he became a member of the firm of Fish & Grinnell, afterward Grinnell, Minturn & Co., which under his lead became one of the principal houses in the shipping line in the world. He was one of the founders of St. Luke's Hospital, and was identified with many other charitable enterprises. Upon the organization of the Union League Club he was chosen its pres., and held the office until his death in New York.

MINUEND, n. *mĭn'ū-ĕnd* [L. *minuend'us*, to be diminished—from *minŭō*, I lessen]: in *arith.*, the number that is to be lessened; the number from which another is to be subtracted.

MINUET, n. *mĭn'ū-ĕt* [F. *menuet*, a dance—from *menu*, small—from L. *minūtus*, small]: a slow graceful dance —so named from the short steps in it; also the tune or air for it. The M. was originally from Poitou, France: its music is said to have been composed by Lully the Elder, and it was danced by Louis XIV. 1653 at Versailles with his mistress. The music of the M. is in $\frac{3}{4}$ time, and is still well known by the celebrated *Minuet de la Cour*, introduced in stage performances.

MINUIT, *mĭn'u-ĭt* (or MIN'UITS, or MIN'NEWIT), PETER: 1580–1641: colonial governor: b. Wesel, Rhenish Prussia. He was a deacon in the Walloon Chh.; removed to Holland; and, some years later, was appointed director for the Dutch W. India Co. at New Netherlands in Amer., in succession to William Van Huist, but with such enlarged powers as made him the first real governor. He landed on Manhattan I., 1626, May 4, and bought it of the Indians for goods of the value of $24. Sending to Holland a ship-load of skins and timber, with the news of his purchase of colony land, he built Fort Amsterdam; also a mill and warehouse; and, with new arrivals, had under him a colony of 300, which he governed with vigor and discretion. In 1627 he established commercial relations with the Plymouth colony, through a correspondence with Gov. Bradford. Abuses, leading to formation of the great patroon estates, caused his recall, 1631, Aug.; and he sailed for Holland 1632, March. Putting into Plymouth, Eng., he was detained on a charge of illegal trading on Eng. colonial ground, but, after diplomatic correspondence, was allowed to proceed, May 27. Not succeeding in Holland, in regaining credit and recovering his office, he went to Sweden 1637, and was engaged by the chancellor, Oxenstiern, to go out under the Sw.

W. India Co. M. sailed from Gothenburg 1637, with a body of Sw. and Finn. colonists, in two vessels, and coming into Delaware Bay, bought of the Indians the land between the s. cape and the falls near Trenton. In 1638, Mar., he undertook the erection of Fort Christiana, near the present site of Wilmington. In spite of vigorous Dutch protests and Indian dangers, and although, in 1640, from failure of provisions, the colony would have taken refuge with the Dutch at Manhattan I., if supplies had not arrived the day before the intended move, the New Sweden, as it was called, under M., proved successful, and was the first permanent European settlement of Delaware. M.'s death, however, near Fort Christiana, was followed, 14 years later, by Dutch aggression and annexation, 1655.

MINUS, n. *mī'nŭs* [L. *minus*, less]: in *arith.*, and *alg.*, the sign of subtraction, thus [—], which, placed between two quantities, means that the latter is to be subtracted from the former.

MINUSCULE, n. *mĭ-nŭs'kūl*, or MINUS'CULA [L. *minusculus*, very small—from *minus*, less]: minute kind of letter or character used in the mediæval MSS.

MINUTE, a. *mĭ-nūt'* [L. *minūtus*, little, small—from *minŭō*, I make less: It. *minuto*, slender: F. *menu*, small]: extremely small or slender; little; diminutive; attentive to small things; exact in details. MINUTELY, ad. *mĭ-nūt'lĭ*, in exact details. MINUTE'NESS, n. *-nĕs*, smallness; slenderness; great exactness.—SYN. of 'minute': fine; exact; critical; circumstantial; particular; small; slender; slight; detailed.

MINUTE, n. *mĭn'ĭt* [F. *minute*, a minute—from mid. L. *minūtă*, small in space or time: L. *minūtim*, in little pieces or morsels—from *minŭō*, I lessen: It. *minuto*, a minute]: small portion of time or duration; 60th part of an hour; 60th part of a degree (see SEXAGESIMAL ARITHMETIC): in *arch.*, 60th part of the diameter of the shaft of a classic column, measured at the base—used as a measure to determine the proportions of the order; a short sketch or note of an agreement, fact, or event; an outline or brief report in writing of the proceedings of any meeting or society or of the purport of any instrument; so called from being taken down shortly and in *minute* or small writing, to be afterward engrossed (see ENGROSS).—MINUTE, in *law*, is a memorandum or record of some act of a court or of parties; in the latter sense, it is used chiefly in Scotland, as in the case of minute of agreement, minute of sale, etc.: V. to put down in writing an outline of the proceedings of a meeting or society. MIN'UTING, imp. MINUTED, pp. *mĭn'ĭt-ĕd*. MINUTELY, ad. *mĭn'ĭt-lĭ*, happening every minute; in detail. MINUTE-BOOK, the book in which the minutes are written. MINUTE-GLASS, a small sand-glass. MINUTE-GUNS, guns fired at short intervals, as signals of distress at sea, or of mourning. MINUTE-HAND, the hand of a clock or watch pointing out the minutes.

MINUTIA, n. *mĭ-nū′shĭ-ă*, MINU′TIÆ, n. plu. *-shĭ-ē* [L. *minūtiă*, smallness, fineness—from *minūtŭs*, little, small: F. *minutie*, a trifle]: the smaller particulars or details.

MINX, n. *mĭngks* [contracted from MINIKIN, which see: comp. Gael. *mineag*, a gentle female]: a word of endearment; but generally, a pert, proud girl; a pert, wanton girl; a mink, which see.

MINY: see under MINE, an excavation.

MIOCENE, n. *mī′ō-sēn* [Gr. *meion*, less; *kainos*, recent]: in *geol.*, term introduced by Lyell to characterize the Middle Tertiary strata, which he supposes to contain a smaller proportion of recent species of mollusca than the newer Pliocene, and more than the older Eocene. For an account of the American M., see TERTIARY. Here only the foreign is noticed.

Strata of this age occur in Britain in two limited and far separated localities—in the island of Mull, and at Dartmoor in s.e. England. In this last district, they exist at Bovey Tracey, in a flat area ten m. long by two m. broad, and consist of clay interstratified with beds of imperfect lignites. Pengelly and Heer have recently examined the strata of this small basin, and have found that all the plants are of Miocene age, and belong to the same species as those found in similar deposits, in continental Europe, Iceland, Greenland, and Arctic America. Their *facies* indicates a warmer climate than the present, and the geographical range of the species is unexampled in the existing flora. The Greenland M. presents a difficult problem, with its remains of vegetation of great luxuriance within 8° 15′ of the n. pole, where now the land is almost continuously covered with snow and ice, and the winter night extends through half the year. The Mull beds are at the headland of Ardtun, and consist of interstratified basalts, ashes, and lignites: there are three leaf-beds, varying in thickness from 1½ to 2½ ft., separated by two beds of ash, the whole resting on, and covered by strata of basalt, and the whole thickness is 131 ft. It is supposed that the leaf-beds were deposited in a shallow lake or marsh, in the vicinity of an active volcano. One of the beds consists of a mass of compressed leaves without stems, and accompanied with abundant remains of an equisetum, which grew in the marsh into which the leaves were blown. The leaves belong to dicotyledons and coniferæ, and are species similar to those of Bovey Tracey.

The Fahluns of France are of this age, as are also part of the Mollassi of Switzerland and the Mayence and Vienna basins. Of the same period are the highly fossiliferous deposits in the Sewalik Hills, India, containing the remains of several elephants, a mammoth, hippopotamus, giraffe, and large ostrich, besides several carnivora, monkeys, and crocodiles, and a large tortoise, whose shell measured 20 ft. across. The European beds contain the remains of the Dinotherium (q.v.).

MIOHIP′PUS: see HORSE, FOSSIL.

MIÖSEN, *mē-ö′zĕn:* lake in Norway, 36 m. by rail n.e. of Christiania; expansion of the river Lougen: length 56 m., greatest breadth 12 m. The scenery is beautiful, and the air invigorating. The lake is a favorite resort in summer.

MIOSTEMONOUS, a. *mī′ō-stĕm′ŏ-nŭs* [Gr. *meiōn*, less; *stēmōn*, a stamen]: in *bot.*, applied to a flower in which the stamens are neither equal to, nor a multiple of, the floral envelopes.

MIR, n. *mēr* [Rus.]: a communal division in Russia.

MIRABEAU, *mĭr′a-bō*, F. *mē-râ-bō′*, HONORÉ GABRIEL RIQUETI, Comte DE: one of the greatest of French statesmen and orators: 1749, Mar. 9—1791, Apr. 2; b. Bignon, near Nemours; son of Victor Riqueti, Marquis de M. (1715–89). M. was descended, by his own account, from the ancient Florentine family of Arrighetti, who being expelled from their native city in 1268, on account of Ghibelline politics, settled in Provence. Jean de Riqueti or Arrighetti purchased the estate of Mirabeau 1562; his grandson, Thomas, happened to entertain here, in 1660, Louis XIV. and Cardinal Mazarin, on which occasion he received from the monarch the title of Marquis Victor Riqueti. The family had acquired wealth in mercantile business at Marseille. M.'s father was a vain and foolish man, wasted his patrimony, wrote books of philanthropy and philosophy, e.g., *L'Ami des Hommes* (5 vols. Par. 1755), and was overbearing in his own house: he procured no fewer than 54 *lettres de cachet* at different times against his wife and his children. M., the eldest son, was endowed with an athletic frame and extraordinary mental abilities, but was of a fiery temper, and disposed to excess. He became lieut. in a cavalry regiment; but continued to prosecute various branches of study with great eagerness, while outrunning his companions in a succession of disgraceful *liaisons*. An intrigue with the youthful wife of an aged marquis brought him into danger, and he fled with her to Switzerland, and thence to Holland, where he subsisted by his pen, among other productions of which, his *Essai sur le Despotisme* attracted great attention. Meanwhile, sentence of death was pronounced against him; and the French minister, at his father's instigation, demanding that he should be delivered up to justice, he and his paramour were apprehended at Amsterdam, and he was brought to the dungeon at Vincennes, and there closely imprisoned for 42 months. During this time he was often in great want, but employed himself in literary labors, writing an *Essai sur les Lettres de Cachet et les Prisons d'état*, published at Hamburg (2 vols. 1782), and a number of obscene tales, by which he disgraced his genius, though their sale supplied his necessities. After his liberation from prison, he subsisted chiefly by literary labor, and still led a very profligate life. He wrote many effective political pamphlets, particularly against the financial administration of Calonne,

receiving pecuniary assistance, it was said, from some of the great bankers of Paris; and became one of the leaders of the liberal party. When the states-general were convened, he sought to be elected as a representative of the nobles of Provence, but was rejected by them on the ground of his want of property; and left them with the threat that, like Marius, he would overthrow the aristocracy. At about this time Count M. seems to have begun to see the miserable folly of his wild and reckless youth, and to have sought to bring himself under at least some degree of control. Though it has been common to accuse him of every kind of vice, the evidence points to excesses in only one direction—though in that direction frightful and disgraceful, and undoubtedly the cause of his early death. In his more sober years, his better nature developed; and a virtue rare in that land at that time was manifested in M.—the virtue of political morality. His opinions were not for sale, though he supported himself by literary work. He purchased a draper's shop, offered himself as a candidate to the third estate, and was enthusiastically returned both at Aix and Marseille. He chose to represent Marseille, and by his talents and admirable oratorical powers soon acquired great influence in the states-general and national assembly. Barnave well characterized him as 'the Shakespeare of eloquence.' M. was characterized by large historical knowledge, logical force, and passionate enthusiasm. With his oratorical gifts, he united a singularly calm and balanced judgment in public affairs. He stood forth as the opponent of the court and of the aristocracy, but regarded the country as by no means ripe for the extreme changes proposed by political theorists, and labored, not for the overthrow of the monarchy, but for the abolition of despotism, and the establishment of a constitutional throne. To suppress insurrection, he effected, 1789, July 8, the institution of the national guard. In some of the contests which followed, he sacrificed his popularity to maintain the throne. As anarchy and revolutionary frenzy increased, the more decided did he become in resistance to their progress; but it was not easy to maintain the cause of constitutional liberty at once against the supporters of the ancient despotism and the extreme revolutionists. The king and his friends were long unwilling to enter into any relations with one so disreputable, but at last, under the pressure of necessity; it was resolved that M. should be invited to become minister. No sooner was this known, than a combination of the most opposite parties, by a decree 1789, Nov. 7, forbade the appointment of a deputy as minister. From this time, M., who never turned back from any course because of the number and power of the adversaries, strove in vain in favor of the most indispensable prerogatives of the crown, and in so doing exposed himself to popular indignation. He still continued the struggle, however, with wonderful ability, and sought to reconcile

the court and the Revolution. If the king and the people could have moved in the direction vigorously urged by M., the French Revolution would not have been the name of horror which it is on the page of history. In 1790, Dec., he was elected pres. of the Club of the Jacobins, and 1791, Feb., of the national assembly. Both in the club and in the assembly he showed great boldness and energy; but soon after his appointment as pres. of the latter, he sank into a state of bodily and mental weakness, consequent on his great exertions and his youthful debaucheries, and died in a few weeks. He was interred with great pomp in the church of Saint Genevieve, the 'Pantheon;' but his body was afterward removed to make room for that of Marat. A complete ed. of his works was published at Paris, 9 vols. 1825–27. His natural son, Lucas Montigny, published *Mémoires Biographiques, Littéraires et Politiques de Mirabeau* (2d ed. 8 vols. Par. 1841), the most complete account which we have of his life. See also Carlyle's sketch of M. in *Miscellaneous Essays*, and *French Revolution*. The *Life of Sir Samuel Romilly* presents Count M.'s character in a far more favorable light than has been familiar to the popular thought. Romilly, one of the purest of men, was M.'s intimate friend during his stay in England; and while not blind to his blemishes of character, and noting as one of his slighter faults his excessive vanity, records his conviction that 'great injustice has been done him;' and that in his public conduct 'he was desirous of doing good, that his ambition was of the noblest kind, and that he proposed to himself the noblest ends.' The acceptance of this judgment of charity leaves the impression still of a wrecked life.

MIRABILITE, n. *mĭ-răb'ĭ-līt* [L. *mīrab'ĭlis*, wonderful]: a name given to sulphate of soda or Glauber's-salt.

MIRABLE, a. *mĭ'rā-bl* [L. *mīrab'ĭlis*, wonderful]: in *OE.*, attracting admiration; wonderful.

MIRACLE, n. *mĭr'ă-kl* [F. *miracle*—from L. *mirac'ulum*, a wonder—from *miror*, I wonder or marvel at: It. *miracolo*]: *literally*, a marvel or wonder; thence, popularly, a supernatural event; something beyond human power to do; an event apparently contrary to the established course of things and effected by Divine power. MIRACULOUS, a. *mĭ-răk'ū-lŭs*, of the nature of a miracle; done by superhuman power; effected by Almighty power, and not by apparent natural causes. MIRAC'ULOUSLY, ad. *-lĭ*. MIRAC'ULOUSNESS, n. *-nĕs*, state of being effected by a miracle. MIRACLE-PLAY, an old dramatic entertainment, the subject of which was taken from the histories of the Old and New Testaments, or from the legends of saints and martyrs (see MYSTERIES).

MIR'ACLE: term commonly applied to certain marvellous works, e.g., healing the sick, raising the dead, changing of water into wine; ascribed in the Bible to some of the ancient prophets, and to Jesus Christ, and some of his apostles or servants. M. signifies simply that which is wonderful—a thing or a deed to be wondered at, being directly from the Latin *miraculum*, a thing unusual—object of wonder or surprise. The same meaning is the governing idea in the term applied in the New Testament to the Christian miracles, *teras*, a marvel, a portent; besides which, they are designated also as *dunameis*, powers, with reference to the power residing in the miracle-worker; and *sēmeia*, signs, with reference to the character or claims of which they were assumed to be the witnesses or guarantees. Under these different names, the one fact recognized is a deed done by a man, and acknowledged by the common judgment of men to exceed man's ordinary powers; a deed, which being above or beyond the common powers of nature as these are understood by men, bears witness to a *supernatural* interposition, or a *superhuman* aid.

In the older speculations on the subject, a M. was generally defined to be a violation or at least a suspension of the order of nature. While, on one hand, it was argued (as by Hume), that such a violation or suspension was absolutely impossible and incredible; it was maintained, on the other, that the Almighty, either by his own immediate agency, or by the agency of others, could interfere with the operation of the laws of nature, in order to secure certain ends, which, without that interference, could not have been secured, and that there was nothing incredible in the idea of a law being suspended or set aside by the person by whom it had been made. The laws of nature and the will or providence of God were, in this view, placed in a certain aspect of opposition to each other, as though clashing at points here and there, and the stronger arbitrarily asserting its superiority. Such a view has, with the advance of philosophical opinion, appeared to many to be inadequate as a theory, and to give an unworthy conception of the Divine character. The great principle of law—which is the essential principle of order or harmony—being the highest conception not only of nature, but of the infinite Divine Providence, in all its manifestations, has asserted itself more dominantly in the realm of thought, and led increasingly to the rejection of the apparently conflicting idea of 'interference,' implied in the old notion of M. Order in nature, and an unchanging will in God, are felt to be first and absolutely necessary principles. The idea of M., accordingly, which seems to be most readily accepted by Christian thinkers of the present day, has its root in this recognized necessity.

All law is to be regarded as the expression, not of a lifeless force, but of an infinitely wise and perfect will. All law must develop itself through natural phenomena; but it is not identified with or bound down to any neces-

sary series of these. If we admit the mainspring of the universe to be a living will, then we may admit that the phenomena through which that will, acting in the form of law, expresses itself, may vary without the will varying or the law being broken or even suspended. We know absolutely nothing of the mode of operation in any recorded M.; we only see certain results. To affirm that these results are either impossible in themselves, or necessarily violations of natural law, is to pronounce a judgment on imperfect data. We can only say that, under an impulse which we must believe proceeds from the Divine will, in which all law exists, the phenomena which we have been accustomed to expect have not followed on their ordinary conditions. But from our point of view we cannot affirm that the question as to *how* this happens is one of interference or violation; it is entirely possible and exceeding probable that it is one of higher and lower ranges of activity. The M. may be but the expression of the one Divine order and beneficent will in a new form, along lines fully in accordance with the order of nature, though not heretofore in the compass of our knowledge. We can no more claim to know all the lines of law that are known to infinite wisdom than we can claim to have created the firm unchanging order of the heavens and the earth.

Nature being but the plastic medium through which the will of the living God is ever manifested to us, and the design of that will being, as it necessarily must be, the good of his creatures, that theory of M. is certainly most rational which does not represent the ideas of laws and of the will of God as separate and opposing forces, but which represents the Divine will as working out its highest moral ends, not against, but through law and order, and evolving from these a new issue, when it has a special beneficent purpose to serve. And thus, too, we are enabled to see in M. not only a wonder and a power, but a sign—a revelation of Divine character, never arbitrary, always generous and loving, the character of one who seeks through all the ordinary courses of nature and operation of law to further His creatures' good, and whose will, when that end is to be served, is not restricted to any one necessary mode or order of expression. Rightly interpreted, M. is not the mere assertion of power, or a mere device to impress an impressible mind; it is the revelation of a will which, while leaving nature as a whole to its established course, can yet witness to itself as above nature, when, by doing so, it can help man's moral and spiritual being to grow into a higher perfection. Even the human will, when disciplined and wisely developed, can use natural laws in lines and to results which to the more limited mind seem contrary to all laws. Such activity is one of the constant characteristics of civilized life.

The evidence for the Christian miracles is of a twofold kind—external and internal. As alleged facts, they are supposed to rest on competent testimony, the testimony

of eye-witnesses, who were neither deceived themselves, nor had any motive to deceive others. They occurred not in privacy, like the alleged supernatural visions of Mohammed, but mostly in the open light of day, amid the professed enemies of Christ. They were not isolated facts, nor wrought tentatively, or with difficulty; but the repeated, the overflowing expression, as it were, of an apparently supernatural life. It seems impossible to conceive, therefore, that the apostles could have been deceived as to their character. They had all the means of scrutinizing and forming a judgment regarding them that they could well have possessed; and if not deceived themselves, they were certainly not deceivers. There is no historical criticism that would now maintain such a theory; even the most positive unbelief has rejected it. The career of the apostles forms throughout an irrefragable proof of the deep-hearted and incorruptible sincerity that animated them. The gospel miracles, moreover, are supposed in themselves to be of an obviously Divine character. They are, in the main, miracles not of ostentatious power, *mere* wonders; but of healing, of beneficence, in which the light equally of the Divine majesty and of the Divine love shines—witnessing to the eternal life which underlies all the manifestations of decay, and all the traces of sorrow in the lower world, and lifting the mind directly to the contemplation of the sphere in which that life dwells and acts.

MIRACLE PLAYS: The earliest dramatic representations of religious themes grew up within the church itself. At certain seasons of the year, tableaux of gospel scenes were shown to the people, a practice which still survives in the representations of the Nativity in modern Catholic churches. The introduction of action and music into these tableaux is easy to understand, particularly in view of the dramatic elements in the celebration of the mass, and in the ritual for special occasions, like the consecration of a church. Simple Latin words were next set to the music accompanying a given scene, and this text was called a *trope*. In time these tropes grew more elaborate, passages in the vernacular were introduced, and popular elements not taken from the Bible were added. Meanwhile, the little plays, which in the beginning had been given in the choir, were transferred to the nave, and set up against the pillars. So popular did these representations become, and so great was the concourse of spectators, that a move outside the building into the churchyard had to be made. Secular elements crept in very rapidly, and the plays were finally transferred to open spaces in the cities and towns. The liturgical drama reached its height in the 13th c.; by the beginning of the 14th c. it had largely passed out of the hands of the clergy, although representations continued to be given in many churches.

The growth of the miracle play in England is due to

the influence of the Normans. There are almost no evidences of dramatic impulse in England before the conquest. The earliest play of which there is mention by name is a *Play of St. Katherine,* at the beginning of the 12th c., produced under the direction of a Frenchman who afterwards became abbot of St. Albans. To the same century belongs the work of Hilarius, a pupil of Abelard, and perhaps of English birth. He wrote Latin plays on subjects taken from the Scriptures, and diversified them with refrains in Old French. A great impetus was given to the plays by the institution of Corpus Christi day, with its elaborate processions and outdoor ceremonial, and many came to be presented at this season, when the conditions of weather were likely to be favorable. In time the procession served as a mere preliminary to the dramatic performances to follow. A desire for more elaborate stage effects and a greater number of incidents within the plays was constantly increasing, until there developed out of the relatively simple early pieces long groups of plays of cyclic character, covering the principal events of the Scripture narrative, in both the Old and the New Testament. The series given at York in 1415 begins with the creation, and ends with the glorification of Mary and Jesus in heaven, embracing 48 separate pieces in all. These cycles were often not all given on one day, but extended over two or more days, or they were divided, and presented in succeeding years.

After leaving the churches, the plays soon passed into the hands of the guilds, or associations of tradesmen. In the 13th c. clerics were forbidden by papal edict to appear on the stage, but these prohibitions were frequently disregarded. The control of the plays by the guilds marks a period of great importance in the history of the English drama. Much care was devoted to the production and acting of the various pieces. The corporation of the city had general charge of the matter, deciding when the performances should be given, and dividing the various scenes among the several companies. An effort was made to have the play suit the character of the guild that gave it; the shipwrights showed the building of the ark, the watermen the flood, and so forth. The plays were given on movable stages called *pageants,* which consisted of 'high scaffoldes with two rowmes,' one beneath which was used as a dressing room, and one above, open on all sides to give a better view, and occasionally provided with a canopy. These wagons moved from place to place, repeating the performance at different stations. The number of these stations varied with the size of the town; there were sometimes a dozen or more. The pageant wagons were gaily painted and decorated. They were generally rectangular, but special shapes were required for the ark, or for hell-mouth, a huge painted head with open jaws belching fire

and smoke. The scenery was of a rude sort. Palaces, temples, and castles were sometimes represented by boxes or wickerwork covered with cloth. Occasionally the actors made use of the open space in front of the pageant; Herod's 'raging' appears to have been partly done in the street. The costumes were often expensive, but frequently grotesque. Herod was attired like a Saracen, with red gloves. Pilate always wore a green cloak, and wielded a huge club. God the Father was represented in person, and dressed all in white, with a gilt wig. The devils and the Evil One were made very realistic, and came to furnish a great deal of low comedy. Various accounts of sums paid for properties and costumes are still preserved.

Four cycles of miracle plays are still extant, the York, Chester, Coventry and Towneley or Woodkirk plays. The Towneley series, so called from the family who long owned the manuscript, much resembles the York cycle, and like it displays much vigor and humor. The Chester plays perhaps appeal more to modern taste. The religious passages are more reverent, the humor less coarse, and the versification less harsh. The Coventry plays are full of didacticism, and this, with the introduction of personified abstractions, relates them more closely than the others to the moralities. Fragments of other cycles have also survived. The Vulgate and the Apocrypha are the chief sources of the text. In places some tragic elevation is reached, marred, however, by repetition and moralizing. Melodramatic and ranting scenes were popular. The comic scenes are often very spirited, and clearly based upon observation of the life of the people. Anachronisms are common, and the supernatural is treated with great naïveté.

The miracle plays were at their best in the time of Chaucer. In the 15th c. the Moralities arose to compete with them for favor, but never equalled them in dramatic achievement. The miracle plays continued to be given until the beginning of the 16th c., but in the reign of Elizabeth they had ceased to be a vital force. Their influence in preparing the way for the Elizabethan drama was very great, however. They introduced elementary types of comedy and tragedy, farce and melodrama, and accustomed the people as a whole to dramatic conventions. They made a national drama possible in the time of Shakespeare, and kept the theatre from being a mere amusement for the nobility, or a diversion for a small group of literary people.

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MIRAC'ULOUS CONCEP'TION, THE: production by the direct power of the Holy Spirit from the life and substance of the Virgin Mary, of the true and complete bodily humanity of Jesus Christ. It is the point at which the established Christian theology dates the essential union of the Son of God—the Word from everlasting—with humanity as subsisting in the flesh. See INCARNATION (under INCARNATE): CHRIST, THE: JESUS CHRIST: MESSIAH: CHRISTOLOGY: CHALCEDON, COUNCIL OF.

MIRAGE, n. *mĭ-râzh'* [F. *mirage*—from *mirer*, to look at carefully]: curious natural illusion, very common in certain localities, and as simple in its origin as astonishing in its effects. Under it is classed the appearance of distant objects as double, or as if suspended in the air, erect or inverted, etc. One cause of mirage is a diminution of the density of the air near the surface of the earth, produced by the transmission of heat from the earth, or in some other way; the denser stratum being thus placed *above*, instead of, as is usually the case, *below* the rarer. Now, rays of light from a distant object, situated in the denser medium (i.e., a little above the earth's level), coming in a direction nearly parallel to the earth's surface, meet the rarer medium at a very obtuse angle, and (see REFRACTION) instead of passing into it, are reflected back to the dense medium; the common surface of the two media acting as a mirror. Suppose, then, a spectator to be situated on an eminence, and looking at an object situated like himself in the denser stratum of air, he will see the object by means of directly transmitted rays; but besides this, rays from the object will be reflected from the upper surface of the rarer stratum of air beneath to his eye. The image produced by the reflected rays will appear inverted, and below the real object, just as an image reflected in water appears when observed from a distance. If the object be a cloud or portion of sky, it will appear by the reflected rays as lying on the surface of the earth, and bearing a strong resemblance to a sheet of water; also, as the reflecting surface is irregular, and constantly varies its position, owing to the constant communication of heat to the upper stratum, the reflected image will be constantly varying, and will present the appearance of a water surface ruffled by the wind. This form of mirage, which even experienced travellers have found completely deceptive, is frequent in the arid deserts of Lower Egypt, Persia, Tartary, etc.

In particular states of the atmosphere, reflection of a portion only of the rays takes place at the surface of the dense medium, and thus double images are formed—one by reflection, and the other by refraction—the first inverted, and the second erect. The phenomena of mirage are frequently much more strange and complicated, the images being often much distorted and magnified, and in

some instances occurring at a considerable distance from the object, as in the case of a tower or church seen over the sea, or a vessel over dry land, etc. The particular form of mirage known as *looming* is very frequently observed at sea, and consists in an excessive apparent elevation of the object. A most remarkable case of this sort occurred 1798, July 26, at Hastings, England. From this place the French coast is 50 m. distant; yet from the sea-side the whole coast of France from Calais to near Dippe was distinctly visible, and continued so three hours. In the Arctic regions it is a common occurrence for whale-fishers to discover the proximity of other ships by means of their images seen elevated in the air, though the ships themselves may be below the horizon. Generally, when the ship is above the horizon, only one image, and that inverted, is found; but when it is wholly or in great part below the horizon, double images, one erect and the other inverted, are frequently seen. The faithfulness and distinctness of these images at times may be imagined from the fact, that Captain Scoresby, while cruising off the coast of Greenland 1822, discovered the fact that his father's ship was in his vicinity from its inverted image in the sky. Another remarkable instance of mirage occurred 1854, May, when, from the deck of the British screw-steamer, *Archer*, then cruising off Oesel, in the Baltic, the whole English fleet of 19 sail, then nearly 30 m. distant, was seen as if suspended in the air upside down. Beside such phenomena as these, the famous *Fata Morgana* (q.v.) of the Strait of Messina sinks into insignificance. The *Spectre of the Brocken*, in Hanover, is another notable instance of mirage. The varieties are indeed numberless: see Brewster's *Optics*, Biot's *Traité de Physique:* for the mathematical theory of the mirage, see the works of Biot, Monge, and Wollaston. See also REFLECTION; REFRACTION.

MIRAN'DOLA, PICO DELLA. See PICO, GIOVANNI DELLA MIRANDOLA.

MIR'BANE. See NITRO-BENZOL.

MIRE, n. *mīr* [Icel. *myri*, a marsh: Sw. *myra*, a bog, a marsh: Dut. *moeyer*, mire—from *moer*, a bog]: deep mud; earth very wet and soft: V. to sink deep or fix in mud; to soil with mud. MI'RING, imp. MIRED, pp. *mīrd*. MIRY, a. *mī'rĭ*, covered with mire; muddy. MI'RINESS, n. *-rĭ-nĕs*, state of being miry.

MIRK, a., or MURK, a. *mėrk* [AS. *mire*, dark, murky: Icel. *myrkr*, dark, or darkness: Gael. *murcas*, sadness, gloom]: in *Scot.* and *OE.*, dark, gloomy: N. darkness; gloom. MIRKSOME, a. *mėrk'sŭm*, in *OE.*, dark; obscure. PIT-MIRK [AS. *pic;* Dut. *pik;* Scot. *pik;* Icel. *bik*, pitch]: in *Scot.*, very dark; pitch-dark.

MIRROR, n. *mĭr'ėr* [F. *miroir;* OF. *mireor*, a mirror—from mid. L. *mirārē*, to behold—from L. *miror*, I won-

der at, I admire]: any polished body capable of reflecting images of objects; a looking-glass: a pattern or example, as 'she was a *mirror* of grace': V. to reflect or shadow forth as in a mirror. MIRRORING, imp. *mĭr'ĕr-ĭng.* MIR'RORED, pp. a. *-ĕrd,* reflected as in a mirror.—A *Mirror* is made usually of glass, lined at the back with a brilliant metal, so as strongly to reflect the image of any object placed before it. When mirrors were invented is not known, but the use of a reflecting surface would become apparent to the first person who saw his own image reflected from water; and probably for ages after the civilization of man commenced, the still waters of ponds and lakes were the only mirrors; but we read in the Pentateuch of mirrors of brass being used by the Hebrews. Mirrors of bronze were in very common use among the ancient Egyptians, Greeks, and Romans; and many specimens are preserved in museums. Praxiteles taught the use of silver in the manufacture of mirrors B.C. 328. Mirrors of glass were made first at Venice A.D. 1300; and judging from those remaining—of which one may be seen at Holyrood Palace, in the apartments of Queen Mary—they were very rude contrivances, compared with modern ones. It was not until 1673 that the making of mirrors was introduced into England. It is now a very important manufacture; and mirrors can be produced of any size to which plate-glass can be cast. After the plate of glass is polished on both sides, it is laid on a perfectly level table of great strength and solidity, usually of smooth stone, made like a billiard-table with raised edges; a sheet or sheets of tinfoil sufficient to cover the upper surface of the glass are then put on and rubbed down smooth, after which the whole is covered with quicksilver, which immediately forms an amalgam with the tin. The superfluous mercury is then run off, and a woolen cloth is spread over the whole surface, and square iron weights are applied. After this pressure has been continued a day and night, the weights and the cloth are removed, and the glass is removed to another table of wood, with a movable top, which admits of gradually increasing inclination until the unamalgamated quicksilver has perfectly drained away, and only the surface of perfect amalgam remains coating the glass, and perfectly adherent to it.

Heat is reflected like light; so that a concave mirror may be used to bring rays of heat to a focus. In this way combustible substances may be set on fire at a distance from the reflector whence they receive their heat. Thus used, a mirror is called a *Burning Mirror.*

MIRROR FOR MAGISTRATES, THE: a once popular work, the first part of which was published in 1555, and the last in 1620. It probably owed its inception to George Ferrers, Master of the King's Revels, during the reign of Henry VIII. It was patterned after Lydgate's *Fall of Princes,* a version of Boccaccio's poems on the

calamities of illustrious men, which had been very popular in England. The stories are told in rhyme, each author taking the character of the 'miserable person' represented, and speaking in the first person. The first one told is that of Robert Tresilian, chief justice of England.

MIRROR WRITING: a manner of writing in which the same lines and characters are made as in normal writing, except that there is a complete reversal of right and left; the person begins at the right and proceeds toward the left, leaving a writing which is the same as normal writing seen in a mirror held at the side of the sheet, or seen from the back of the sheet by looking through it. Mirror writing is produced by the left hand when writing simultaneously with the right; also by the right hand when writing on the under side of a table or sheet of paper. Children are apt to confuse direct and mirror writing, and backward children may persist in this mode of writing.

MIRTH, n. *mėrth* [Lap. *murre*, delight: Gael. *mir*, to sport, to play; *mireag*, a sporting, frolic: perhaps connected with Eng. *merry*]: social merriment; the excitement of pleasurable feelings in company; noisy gayety. MIRTHFUL, a. *mėrth'fûl*, merry; jovial. MIRTH'FULLY, ad. *-lĭ*. MIRTH'FULNESS, n. *-nĕs*, state or quality of being mirthful. MIRTH'LESS, a. *-lĕs*, without mirth.—SYN. of 'mirth': frolic; fun; gayety; laughter; merriment; festivity; jollity; gladness; joyousness; hilarity; glee; cheerfulness.

MIRY. See under MIRE.

MIRZA, n. *mėr'zä* [Pers. *mirza*, corrupted from *Emirzadeh*, sons of the prince]: in *Persia*, when *prefixed* to the surname of a person, the common title of honor among the Persians; but when *annexed* to the surname, it designates a prince or a male of the blood-royal.

MIRZAPUR, *mėr-za-pôr'*: India, a city and district of the Benares division of the United Provinces of Agra. Mirzapur, signifying the Prince's Town, the capital of the district, is on the right bank of the Ganges, 56 m. by rail s.e. of Allahabad. It presents an imposing appearance from the river, with fine ghats leading down to it, and numerous mosques, temples, and handsome European houses occupying some of the most conspicuous sites, but the interior is disappointing. It has the largest mart in Upper India for grain, cotton, and other raw produce, but with the railway era and the rise of Cawnpore to commercial importance, much of its trade has migrated elsewhere. Shellac, brassware, and carpets are manufactured. There are imports of grain, sugar, cloth, metals, fruit, spices, tobacco, lac, salt, and cotton; and exports of the same articles with manufactured lac-dye, shellac, and ghee butter. The military cantonment is 3 m. n.e. of the town, on a peninsula formed by the windings of the Ganges. Pop. (1901) 79,787.

MIS, *mĭs* [Goth. *mis*, implying error, separation: Icel. *á mis*, astray, in turns; *missa*, to lose: AS. and Icel. *mis*]: a prefix, signifying 'divergence'; error; defect; wrong. *Note.*—Skeat affirms that *mis* the prefix is sometimes used for the OF. *mes*, as in *mes-chief* = mischief, which *mes* is derived from L. *minus*, less, used as a depreciatory prefix in 'mis-alliance, mis-chance, mis-creant, mis-count,' etc.

MISACCEPTATION, n. *mĭs′ăk-sĕp-tā′shŭn* [*mis*, error, and *acceptation*]: the taking in a wrong sense.

MISADVENTURE, n. *mĭs′ăd-vĕn′tūr* [*mis*, error, and *adventure:* comp. F. *mes*, prefix—from L. *minus*]: a mishap; ill luck; unlucky accident.—SYN.: misfortune; calamity; disaster; infelicity; mischance.

MISADVISED, a. *mĭs′ăd-vīzd′* [*mis*, wrong, and *advised*]: ill-advised; ill-directed.

MISALLIANCE, n. *mĭs′ăl-lī′ăns* [*mis*, wrong, and *alliance:* comp. F. *mes*, for *mis*—from L. *minus*]: a disparaging or improper connection by marriage; a marriage below one's rank; any wrong alliance; also written MESALLIANCE.

MISANTHROPE, n. *mĭs′ăn-thrōp* [Gr. *misanthrōpŏs*, hating mankind—from *misĕō*, I hate; *anthrōpos*, man: F. *misanthrope*]: a hater of mankind; also MISANTHROPIST, n. *mĭs-ăn′thrō-pĭst.* MIS′ANTHROP′IC, a. *-thrŏp′ĭk*, or MIS′ANTHROP′ICAL, a. *-ĭ-kăl*, hating or having a dislike to mankind. MISANTHROPY, n. *mĭs-ăn′thrō-pĭ*, hatred or dislike to mankind—opposite of *philanthropy.*

MISAPPLY, v. *mĭs′ăp-plī′* [*mis*, wrong, and *apply*]: to apply to a wrong purpose. MIS′APPLY′ING, imp. MIS′APPLIED′, pp. *-plīd′.* MISAPPLICATION, n. *mĭs′ăp-plĭ-kā′shŭn*, an application to a wrong purpose.

MISAPPREHEND, v. *mĭs′ăp-prē-hĕnd′* [*mis*, wrong, and *apprehend*]: to take in a wrong sense; to misunderstand. MIS′APPREHEN′DING, imp. MIS′APPREHEN′DED, pp. MIS′APPREHEN′SION, n. *-hĕn′shŭn*, a mistake; misunderstanding; misconception.

MISAPPROPRIATE, v. *mĭs′ăp-prō′prĭ-āt* [*mis*, wrong, and *appropriate*]: to use for a purpose for which it was not designed. MIS′APPRO′PRIATING, imp. MIS′APPRO′PRIATED, pp. MIS′APPRO′PRIA′TION, n. *-prĭ-ā′shŭn*, wrong appropriation.

MISBECOME, v. *mĭs′bē-kŭm′* [*mis*, wrong, and *become*]: to suit ill; not to become. MIS′BECOM′ING, imp.: ADJ. unseemly; improper. MIS′BECOM′INGLY, ad. *-lĭ.*

MISBEGOTTEN, a. *mĭs′bē-gŏt′n* [*mis*, wrong, and *begotten*]: unlawfully begotten.

MISBEHAVE, v. *mĭs′bē-hāv′* [*mis*, wrong, and *behave*]: to conduct one's self improperly. MIS′BEHA′VING, imp. MIS′BEHAVED′, pp. *-hāvd′.* MIS′BEHAV′IOR, n. *-hāv′yĕr*, ill conduct; rude or uncivil behavior.

MISBELIEF, n. *mĭs′bē-lēf′* [*mis*, wrong, and *belief*]: wrong belief; false religion.

MISBELIEVE, v. *mĭs′bĕ-lēv′* [*mis*, wrong, and *believe*]: to believe erroneously. MIS′BELIEV′ING, imp. MIS′BELIEVED′, pp. *-lēvd′*. MIS′BELIEV′ER, n. one who believes erroneously.

MISCALCULATE, v. *mĭs-kăl′kū-lāt* [*mis*, wrong, and *calculate*]: to calculate wrongly. MISCAL′CULATING, imp. MISCAL′CULATED, pp. MISCAL′CULA′TION, n. *-lā′-shŭn*, an erroneous calculation.

MISCALL, v. *mĭs-kawl′* [*mis*, wrong, and *call*]: to call by a wrong name; to abuse or revile. MISCALL′ING, imp. MISCALLED′, pp. *-kawld′*: ADJ. misnamed.

MISCARRIAGE, n. *mĭs-kăr′ĭj* [*mis*, wrong, and *carriage*]: failure; unfortunate issue of an undertaking; the expulsion of the fœtus within six weeks after conception. *Note.*—The expulsion of the fœtus between six weeks and six months is called *abortion;* and if birth occurs any time between six and nine months, it is called *premature labor* or *birth; miscarriage* and *abortion* take place without life, but in a *premature birth* there very frequently is life.

MISCARRY, v. *mĭs-kăr′ĭ* [*mis*, wrong, and *carry*]: to fail of the intended effect; not to reach its destination; to expel the fœtus within six weeks after conception. MISCAR′RYING, imp. MISCAR′RIED, pp. *-kăr′ĭd*.

MISCEGENATION, n. *mĭs′sĕ-jĕn-ā′shŭn* [L. *miscĕō*, I mix; *genĕrĕ*, to beget]: mixing of races; interbreeding of white men with women of another and lower race, or conversely. The term in the United States has application specially to amalgamation of the white and negro races, such as was fostered by the social conditions of slavery, but is said to have now almost ceased. See MIXED RACES.

MISCELLANY, n. *mĭs′sĕl-ā-nĭ* or *mĭs-sĕl′lā-nĭ* [F. *miscellanées*—from L. *miscellānĕă*, a hash of different sorts of broken meat, miscellaneous—from *miscĕō*, I mix: It. *miscellanea*]: a mass or mixture, generally; a book containing a variety of literary compositions. MIS′CELLANA′RIAN, n. *-nā′rĭ-ăn*, a writer of miscellanies: ADJ. pertaining to. MIS′CELLA′NEOUS, a. *-lā′nĭ-ŭs*, consisting of several kinds mixed. MIS′CELLA′NEOUSLY, ad. *-lĭ*. MIS′CELLA′NEOUSNESS, n. *-ŭs-nĕs*, the state of being miscellaneous. MISCEL′LANIST, n. *-lă-nĭst*, a writer in a miscellany or of miscellanies.

MISCHANCE, n. *mĭs-chăns′* [*mis*, wrong, and *chance:* OF. *meschance*, a mischief]: ill fortune; mishap.—SYN.: calamity; misfortune; disaster; misadventure; infelicity; ill luck.

MISCHIEF, n. *mĭs′chĭf* [OF. *meschef*, misfortune—from *mes*, error; *chef*, the head: Sp. *menoscabo*, loss—from *menos*, less; *cabo*, the head: L. *minus*, less; *caput*, the head]: that which turns out ill; harm; hurt; injury, whether intended or not; ill consequence. MISCHIEVOUS, a. *mĭs′chĭv-ŭs*, injurious; hurtful; producing harm or injury; prone to do mischief. MIS′CHIEVOUSLY, ad.

-N. MIS'CHIEVOUSNESS, n. *-nĕs*, the quality of being mischievous; hurtfulness.—SYN. of 'mischief': evil; ill; damage; detriment; wrong; injustice;—of 'mischievous': pernicious; destructive; detrimental; harmful; noxious; spiteful; wicked.

MISCHNA: see MISHNA.

MISCIBLE, a. *mĭs'sĭ-bl* [F. *miscible*—from mid. L. *miscib'ĭlis*—from L. *miscĕō*, I mix]: in *OE.*, capable of being mixed or mingled; that may be mingled, as one liquid with another.

MISCOMPUTE, v. *mĭs'kŏm-pūt'* [*mis*, wrong, and *compute*]: to compute or reckon wrongly. MIS'COMPU'TING, imp. MIS'COMPU'TED, pp. MISCOM'PUTA'TION, n. *-tā'-shŭn*, erroneous computation.

MISCONCEIVE, v. *mĭs'kŏn-sēv'* [*mis*, wrong, and *conceive*]: to have or receive a false notion of; to interpret incorrectly. MIS'CONCEIV'ING, imp. MIS'CONCEIVED', pp. *-sēvd'*.—SYN. of 'misconceive': to mistake; misjudge; misunderstand; misapprehend.

MISCONCEPTION, n. *mĭs'kŏn-sĕp'shŭn* [*mis*, wrong, and *conception*]: wrong notion or understanding of a thing; false opinion.

MISCONDUCT, n. *mĭs-kŏn'dŭkt* [*mis*, wrong, and *conduct*]: ill behavior: V. *mĭs'kŏn-dŭkt'*, to mismanage; to conduct amiss; to misbehave. MIS'CONDUC'TING, imp. MIS'CONDUC'TED, pp.—SYN. of 'misconduct, n.': misdeed; misbehavior; delinquency; misdemeanor; mismanagement; offense.

MISCONSTRUE, v. *mĭs-kŏn'strô* [*mis*, wrong, and *construe*]: to interpret in a wrong sense either words or things. MISCON'STRUING, imp. MISCON'STRUED, pp. *-strôd*. MIS'CONSTRUC'TION, n. *-strŭk'shŭn*, wrong interpretation of words or things.

MISCOUNT, v. *mĭs-kownt'* [*mis*, wrong, and *count:* OF. *mesconter*, to miscount]: to mistake in counting. MISCOUNT'ING, imp. MISCOUNT'ED, pp.

MISCREANT, n. *mĭs'krē-ănt* [OF. *mescreant*, misbelieving, miscreant—from L. *minus credĕrĕ*, to believe amiss: F. *mécréant*, one who believes amiss, a miscreant: It. *miscredente*, an unbeliever, a miscreant]: originally, one who holds a false faith—the word which, in their detestation of the so-called heresy, the multitude applied to the early Protestants, as to the followers of Wickliffe; a vile unprincipled wretch: ADJ. unbelieving.

MISCREATE, v. *mĭs'krē-āt'* [*mis*, wrong, and *create*]: in *OE.*, to form unnaturally. MIS'CREA'TING, imp. MIS'CREA'TED, pp.

MISDATE, n. *mĭs-dāt'* [*mis*, wrong, and *date*]: wrong date: V. to date wrongly. MISDA'TING, imp. MISDA'TED, pp.

MISDEED, n. *mĭs-dēd'* [*mis*, wrong, and *deed*]: an evil deed; a wicked action.—SYN.: crime; fault; offense; transgression; trespass; misconduct; misdemeanor.

MISDEEM, v. *mĭs-dēm′* [*mis*, wrong, and *deem*]: in *OE.*, to judge ill of; to mistake. MISDEEM′ING, imp. MISDEEMED′, pp. *-dēmd′*.

MISDEMEAN, v. *mĭs′dĕ-mēn′* [*mis*, wrong, and *demean*]: to behave ill. MISDEMEANOR, n. *mĭs′dĕ-mēn′ér*, ill behavior; evil conduct; a petty crime.—SYN. of 'misdemeanor': see under MISDEED.

MISDEMEAN′OR: lesser of two great classes into which crimes below the grade of treason are divided, Felony (q.v.) being the greater; but does not seem properly to include the numerous petty offenses which local magistrates have power to try and punish, and for which there is no specific legal designation. Misdemeanors may be either violations of the common law or offenses specifically noted by statute. To the former class belong injuries to the property of another or of the public, disturbances of the peace, cruel treatment of animals, endangering the safety of others by carelessness or violence, etc. For violations of a statute, an indictment may be secured, and the penalty is largely determined by the statute itself. In common law, offenses under the head of misdemeanors are punishable either by fine or imprisonment, or both, as the court may decide. In some states, however, there are limits to the degree of punishment which may be imposed. A M. is sometimes settled by arbitration even after it has been brought into court. But, while the court may waive criminal proceedings when a satisfactory arrangement has been made by the parties directly concerned, its consent to the compromise must be secured in order to insure its validity. The costs incurred in the case are imposed on the offender. Whenever a sentence is imposed for a M., it is at the option of the court to require bonds that the offender shall keep the peace.

MISDESERT, n. *mĭs′dĕ-zĕrt′* [*mis*, wrong, and *desert*]: in *OE.*, wrong or ill desert.

MISDIET, n. *mĭs-dī′ĕt* [*mis*, wrong, and *diet*]: in *OE.*, improper food.

MISDIRECT, v. *mĭs′dĭ-rĕkt′* [*mis*, wrong, and *direct*]: to give a wrong direction to; to direct to a wrong person or place. MIS′DIRECT′ING, imp. MIS′DIRECT′ED, pp. MIS′DIREC′TION, n. *-rĕk′shŭn*, evil direction.

MISDO, v. *mĭs-dō′* [*mis*, wrong, and *do:* Dut. *misdoen;* Ger. *missthun*, to misdo]: to do wrong; to do amiss; to commit faults. MISDO′ING, imp. doing wrong: N. an offense. MISDO′ER, n. *-ér*, one who commits a fault or crime.

MISDOUBT, v. *mĭs-dowt′* [*mis*, wrong, and *doubt*]: to suspect, as of deceit or crime: N. suspicion, as of crime or danger. MISDOUBT′FUL, a. misgiving; full of grave doubts.

MISELTOE: see MISTLETOE.

MISEMPLOY, v. *mĭs′ĕm-ploy′* [*mis*, wrong, and *employ*]: to employ to no purpose, or to a bad purpose; to use amiss. MIS′EMPLOY′ING, imp. MIS′EMPLOYED′, pp. *-ploydʹ*.

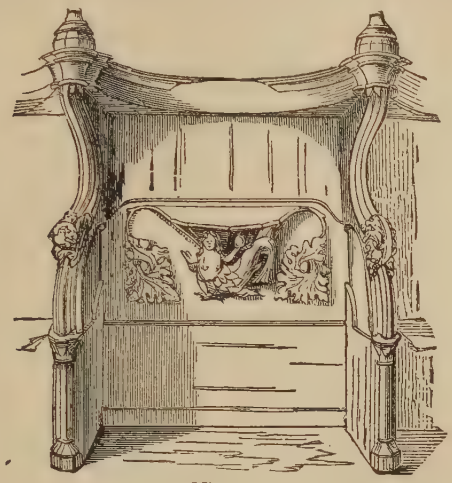
MISENO, *mē-sā′nō:* promontory of the province of Naples, 9 m. s.w. of the city of Naples. On the outskirts of the promontory are the extensive ruins of the ancient city Misenum, including a vast church and theatre. M. is much visited on account of its wonderful grotto Draconara, and a curious subterranean building or labyrinth, called the Hundred Chambers, supposed to have been anciently used as dungeons.

MISER, n. *mī′zĕr* [L. *miser*, miserable: It. and Sp. *misero*, wretched, miserable]: one whose chief pleasure is the acquirement and hoarding up of money; one who, though wealthy, lives miserably through dread of poverty. MI′SERLY, a. *-lĭ*, very covetous; very mean; sordid; niggardly.—SYN. of 'miserly': stingy; mean; parsimonious; avaricious; penurious; covetous.

MISERABLE, a. *mĭz′ĕr-ă-bl* [OF. *miserable*—from L. *miserābĭlĭs*, deserving of pity—from *misĕror*, I pity—from *miser*, wretched: It. *miserabile*]: very unhappy; wretched; extremely poor or mean; despicable; barren. MIS′ERABLY, ad. *-ă-blĭ*. MIS′ERABLENESS, n. *-bl-nĕs*, the state of being miserable. MISERY, *mĭz′ĕr-ĭ* [F. *misère*—from L. *miseriă*, misery]: extreme pain of body or mind; great unhappiness; distress; calamity; in *OE.*, covetousness; avarice.—SYN. of 'miserable': forlorn; abject; pitiable;—of 'misery': misfortune; unhappiness; wretchedness; anguish; torture; agony; torment.

MISERERE, n. *mĭz′ĕr-ē′rĕ* [L. have mercy—from *misĕror*, I have mercy]: in Rom. Cath. usage, name of Ps. l. of the Vulgate (li. in authorized version), beginning in Latin with the word *Miserere*, Have mercy. It is one of the so-called 'Penitential Psalms,' and is commonly believed to have been composed by David in the depth of his remorse for the double crime which the prophet Nathan rebuked in the well-known parable (II Sam. xii.). Another opinion, however, attributes this psalm to Manasses, or to some of the psalm-writers of the captivity. The M. is of frequent occurrence in the services of the Roman Church; and in the celebrated service of Tenebræ, as performed in the Sixtine Chapel at Rome, it forms, as chanted by the pope's choir, one of the most striking and impressive chants in the entire range of sacred music. It is sung on each of the three nights in Holy Week (q.v.) on which the office of Tenebræ is held, with different music on each of the three occasions, the three composers being Bai, Baini, and the still more celebrated Allegri.—M. is the name also of one of the evening services in Lent, which is so called from the singing of that psalm; which service includes a sermon, commonly on the duty of sorrow for sin.—MIS′ERERE is the name also of a projection on the under side of the seats of the stalls of mediæval churches and chapels,

etc.; usually ornamented with carved work, and so shaped that, when the seat-proper is folded up, it forms a small seat at a higher level, sufficient to afford some



Miserere:
From Billings's *Carlisle Cathedral*.

support to a person resting upon it. Aged and infirm ecclesiastics were allowed to use these during long services.

MISERY: see under MISERABLE.

MISFEASANCE, n. *mĭs-fā′zăns* [OF. *mes*, wrong; *faisance*, manner, method: F. *faisances*, manorial services]: a trespass; a wrong done; the improper doing of an act which a person might lawfully do. M. in law is the doing of a positive wrong, in distinction from nonfeasance, which means a mere omission. Acts are sometimes followed with different legal consequences, according as they fall under the head of misfeasance or nonfeasance.

MISFEIGN, v. *mĭs-fān′* [*mis*, wrong, and *feign*]: in *OE.*, to feign with an ill design.

MISFIT, n. *mĭs-fĭt′* [*mis*, wrong, and *fit*]: a bad fit.

MISFORM, v. *mĭs-fawrm′* [*mis*, wrong, and *form*]: to make of an ill form. MISFORMING, imp. *mĭs-fawr′mĭng*. MISFORMED′, pp. *-fawrmd′*.

MISFORTUNE, n. *mĭs-fŏr′tūn* or *-chûn* [*mis*, wrong, and *fortune*]: ill fortune; adversity; mishap; disaster; calamity.—SYN.: mischance; misadventure; ill; harm.

MISGIVE, v. *mĭs-gĭv′* [*mis*, wrong, and *give*]: to fill with doubt; to deprive of confidence; to fail, applied to the heart, as, my heart *misgave* me. MISGIV′ING, imp.: N. a failing of confidence; doubt; mistrust. MISGAVE′, pt. *-gāv′*. MISGIV′EN, pp. *-gĭv′n*.

MISGOTTEN, a. *mĭs-gŏt'n* [*mis*, wrong, and *gotten*]: in *OE.*, unjustly obtained.

MISGOVERN, v. *mĭs-gŭv'ĕrn* [*mis*, wrong, and *govern*]: to govern ill; to administer unfaithfully. MISGOV'ERNING, imp. MISGOV'ERNED, pp. *-ĕrnd.* MISGOV'ERNMENT, n. *-mĕnt*, ill management either of public or of private affairs; disorder; irregularity.

MISGRAFF, v. *mĭs-grăf'* [*mis*, wrong, and *graff*]: in *OE.*, to graff on a wrong or improper stock.

MISGUIDE, v. *mĭs-gīd'* [*mis*, wrong, and *guide*]: to lead or guide into error; to direct ill. MISGUID'ING, imp. MISGUID'ED, pp. MISGUID'ANCE, n. *-gīd'ăns*, the act of leading into error; false direction. MISGUID'INGLY, ad. *-lĭ.*

MISHANDLE, v. *mĭs-hănd'l* [*mis*, wrong, and *handle*]: to bungle; to treat badly.

MISHAP, n. *mĭs-hăp'* [*mis*, wrong, and *hap*]: ill chance; an accident.—SYN.: see MISFORTUNE.

MISHAPPEN, v. *mĭs-hăp'n* [*mis*, wrong, and *happen*]: to happen ill.

MISHEAR, v. *mĭs-hēr'* [*mis*, wrong, and *hear*]: to hear imperfectly.

MISHMEE BITTER, *mĭsh'mē bĭt'ĕr:* root of *Coptis Teeta* (see COPTIS), a plant found in the mountainous regions on the borders of India and China; of the same genus with the Golden Thread of the northern parts of the world, and not unlike it. The root is in much use and esteem in parts of the east as a stomachic and tonic, and has begun to be known in Europe.—The root also of *C. trifoliata* is used as a bitter.

MISHNA, n., or MISCHNA, *mĭsh'nă* [Heb. *mishnah*, repetition, explanation—from *shanah*, to repeat, also to learn]: great collection of decisions by the ancient Rabbis on the Hebrew law, including traditions of the Jews and interpretations of passages of Scripture; forming, with the *Gemara*, the text of the Talmud. MISH'NIC, a. *-nĭk*, pertaining to or relating to the Mishna.—*Mishna* comprises the body of the 'Oral Law,' or the juridico-political, civil, and religious code of the Jews; and forms, as such, a kind of complement to the Mosaic or Written Law, which it explains, amplifies, and immutably fixes. It was not, however, the sole authority of the schools and the masters on which these explanations and the new ordinances to which they gave rise depended, but rather certain distinct and well-authenticated traditions, traced to Mount Sinai itself. No less were certain special letters and signs in the Written Law appealed to in some cases, as containing an indication to the special, newly issued, or fixed prohibitions or rules: see HALACHA. The M. (to which the Toseftas and Boraithas form supplements) was finally redacted, after some earlier incomplete collections, by Jehudah Hanassi, A.D. 220 at Tiberias. It is written mostly in pure Hebrew, and is divided into six portions (Sedarim): 1.

Zeraim (Seeds), on Agriculture 2. Moed (Feast), on the Sabbath, Festivals, and Fasts; 3. Nashim (Women), on Marriage, Divorce, etc. (embracing also the laws on the Nazirship and Vows); 4. Nezikin (Damages), chiefly civil and penal law (also containing the ethical treatise Aboth); 5. Kodashim (Sacred Things), Sacrifices, etc.; description of the Temple of Jerusalem, etc.; 6. Tehoroth (Purifications), on pure and impure things and persons. Of translations of the Mishna may be mentioned that of Surenhusius in Latin (1698-1703); that of Rabe in German (1760-3); that of Hoffman and Baneth in German (1900); that of Castiglione in Italian (1904). A vast Mishna literature exists in German and Hebrew. See TALMUD.

MISILME'RI (corrupted from *Menzil-al-Amir*, Village of the Emirs): town of the island of Sicily, province of Palermo, 7 m. s.e. of Palermo city. It is a straggling, poverty-stricken town. It was at Misilmeri that Garibaldi, 1860, May, joined the Sicilian insurgents; and it was by a short cut from Misilmeri to Palermo, through the pass of Mezzagna, that he advanced on Palermo and took it by a *coup-de-main*. Misilmeri was formerly a notorious harbor of banditti. Pop. 10,500.

MISIMPROVE, v. *mĭs'ĭm-prôv'* [*mis*, wrong, and *improve*]: to abuse; to improve to a bad purpose. MIS'IMPROV'ING, imp. MIS'IMPROVED', pp. *-prôvd'*. MIS'IMPROVE'MENT, n. *-prôv'mĕnt*, ill use or employment.

MISINFORM, v. *mĭs'ĭn-fawrm'* [*mis*, wrong, and *inform*]: to give wrong information to. MIS'INFOR'MING, imp. *-fawr'mĭng*. MIS'INFORMED', pp. *-fawrmd'*.

MISINTEND, v. *mĭs'ĭn-tĕnd'* [*mis*, wrong, and *intend*]: in *OE.*, to misdirect; to aim badly. MISINTEND'ED, a. ill-directed.

MISINTERPRET, v. *mĭs'ĭn-tĕr'prĕt* [*mis*, wrong, and *interpret*]: to understand or explain in a wrong sense; to form false opinions or notions. MIS'INTER'PRETING, imp. MIS'INTER'PRETED, pp. MIS'INTER'PRETER, n. one who interprets wrongly. MIS'INTER'PRETA'TION, n. *-shŭn*, a mistaken or false interpretation.

MISJOINDER: in law, a term used in equity pleading to denote the improper union of causes of action in a single suit at law.

MISJUDGE, v. *mĭs-jŭj'* [*mis*, wrong, and *judge*]: to judge erroneously; to form false opinions or notions of; to mistake. MISJUDG'ING, imp. MISJUDGED, pp. *-jŭjd'*. MISJUDG'MENT, n. *-mĕnt*, an unjust judgment or determination.

MISLAY, v. *mĭs-lā'* [*mis*, wrong, and *lay*]: to put aside and not afterward to recollect where; to lose; to lay in a wrong place, or out of its proper place. MISLAY'ING, imp. *-lā'ĭng*. MISLAID', pt. and pp. *-lād'*.

MISLE, v. *mĭz'l* [from *mist* (see MIZZLE)]: to rain in very fine drops like a thick mist. MIS'LING, imp. MISLED, pp. *mĭz'ld.*

MISLEAD, v. *mĭs-lēd'* [*mis*, wrong, and *lead*]: to lead astray or into error; to deceive; to delude; to beguile. MISLEAD'ING, imp.: N. act of one who misleads. MISLED', pt. and pp. *-lĕd'*. MISLEAD'ER, n. *-ér*, one who leads to ill.

MISLEARNED, a. *mĭs-lĕrn'ĕd* [*mis*, wrong, and *learned*]: not accurately or properly learned.

MISLED, pt. and pp. of MISLEAD, which see.

MIS'LETOE: see MISTLETOE.

MISLIKE, v. *mĭs-līk'* [*mis*, wrong, and *like:* AS. *mislícan*, to displease]: to dislike.

MISLIN, or MISLEN: see MASLIN.

MISLIVE, v. *mĭs-lĭv'* [*mis*, wrong, and *live*]: in *OE.*, to live ill.

MISMANAGE, v. *mĭs-măn'āj* [*mis*, wrong, and *manage*]: to manage or conduct ill, as any matter of business. MISMAN'AGING, imp. MISMAN'AGED, pp. *-ājd.* MISMAN'AGEMENT, n. *-āj-mĕnt*, improper or wrong management of any matter or affair.

MISNAME, v. *mĭs-nām'* [*mis*, wrong, and *name*]: to call by the wrong name. MISNA'MING, imp. MISNAMED', pp. *-nāmd'*.

MISNIA, or MEISSEN: see MEISSEN.

MISNOMER, n. *mĭs-nō'mĕr* [OF. *mes*, badly, for L. *minus*, less, and F. *nommer*, to name: *mis* for *mes*, wrong, and L. *nominārĕ*, to name]: a wrong name; a misnaming. In *law*, the giving of a wrong name to a party in a suit. Formerly, the objection of M. was of some importance, but now is of none, as it is easily cured by amendment.

MISNUMBER, v. *mĭs-nŭm'bĕr* [*mis*, wrong, and *number*]: to count or reckon wrongly.

MISOGAMIST, n. *mĭs-ŏg'ă-mĭst* [Gr. *misĕō*, I hate; *gamos*, marriage]: a hater of marriage. MISOG'AMY, n. *-ă-mĭ*, hatred or aversion to marriage.

MISOGYNY, n. *mĭs-ŏg'-ĭ-nĭ* [Gr. *misĕō*, I hate; *gŭnē*, a woman]: hatred or aversion to women. MISOG'YNIST, n. *-ĭ-nĭst*, a woman-hater.

MISORDER, v. *mĭs-ŏr'dĕr* [*mis*, wrong, and *order*]: in *OE.*, to conduct ill; to manage irregularly.

MISPICKEL, n. *mĭs'pĭk-l* [said to be from O. Ger. *mispückel*]: arsenical pyrites, an arsenide with sulphide of iron, of a tin-white color and strong metallic lustre; composition 33·54 per cent. iron, 33·42 arsenic, 21·08 sulphur; hardness 5·5 to 6; specific gravity 6 to 6·4; found mostly in crystalline rocks, and used in making white arsenic.

MISPLACE, v. *mĭs-plās'* [*mis*, wrong, and *place*]: to put in a wrong place; to set or place on an improper object, as confidence or affections. MISPLA'CING, imp. MISPLACED', pp. *-plāst'*. MISPLACE'MENT, n. *-plās'mĕnt*, the state of being misplaced; the act of putting in a wrong place.

MISPRINT, v. *mĭs-prĭnt'* [*mis*, wrong, and *print*]: to mistake in printing; to print wrong: N. *mĭs'prĭnt*, a mistake in printing. MISPRINT'ING, imp. MISPRINT'ED, pp.

MISPRISE, or MISPRIZE, v. *mĭs-prīz'* [OF. *mespriser*, to disesteem, to contemn—from OF. *mes*, badly—from L. *minus*, less, and mid. L. *pretĭārĕ*, to prize, to esteem —from L. *pretĭŭm*, a price]: in *OE.*, to slight; to undervalue; to scorn; to despise; to mistake. MISPRIS'ING, imp. MISPRISED', pp. *-prĭzd'*.

MISPRISION, n. *mĭs-prĭzh'ŭn* [OF. *mespris*, a neglect or contempt; *mesprison*, error, offense—from *mesprendre*, to mistake, to transgress—from OF. *mes*, badly—from L. *minus*, less, and mid. L. *prensĭōnem* for *prehensĭōnem*, a seizing]: in *law*, a term applied to all such high offenses as are under the degree of capital, but nearly bordering thereon: neglect, negligence, or contempt; mistake. *Note.*—MISPRISION was confused with MISPRISE in the sense of 'contempt,' from OF. *mespris*, 'contempt,' and thus '*misprision* of treason' was defined to be 'neglect or light account made of treason'; and again, '*misprision* of clerks' was 'neglect of clerks in keeping the state records' or records of courts of law—see Skeat.

MISPRIZE: see MISPRISE.

MISPRONOUNCE, v. *mĭs'prō-nowns'* [*mis*, wrong, and *pronounce*]: to speak incorrectly; to pronounce wrongly. MIS'PRONOUN'CING, imp. MIS'PRONOUNCED', pp. *-nownst'*. MIS'PRONUN'CIA'TION, n. *-nŭn'sĭ-ā'shŭn*, wrong or improper pronunciation.

MISPROUD, a. *mĭs-prowd'* [*mis*, wrong, and *proud*]: in *OE.*, viciously proud.

MISQUOTE, v. *mĭs-kwōt'* [*mis*, wrong, and *quote*]: to cite or quote incorrectly. MISQUO'TING, imp. MISQUO'TED, pp. MIS'QUOTA'TION, n. *-kwō-tā'shŭn*, the act of quoting wrongly; the wrong quotation itself.

MISRATE, v. *mĭs-rāt'* [*mis*, wrong, and *rate*]: to reckon or estimate incorrectly. MISRA'TING, imp. MISRA'TED, pp.

MISRECKON, v. *mĭs-rĕk'n* [*mis*, wrong, and *reckon*]: to compute incorrectly. MISRECK'ONING, imp. MISRECK'ONED, pp. *-rĕk'nd*.

MISREPORT, v. *mĭs'rĕ-pōrt'* [*mis*, wrong, and *report*]: to give an incorrect account of; to make a wrong report: N. a false or incorrect account of. MIS'REPORT'ING, imp. MIS'REPORT'ED, pp.

MISREPRESENT, v. *mĭs-rĕp′rĕ-zĕnt′* [*mis*, wrong, and *represent*]: to represent falsely or incorrectly. MISREP′RESENT′ING, imp. MISREP′RESENT′ED, pp. MISREP′RESENTA′TION, n. *-zĕn-tā′shŭn*, a false or incorrect account given from mistake, carelessness, or malice; a softened expression for a lie or falsehood.

MISREPRESENTA′TION, in a legal view, or as usually termed, fraudulent M., is that kind of lie for which courts of law will give redress. It consists in a wilful falsehood as to some material thing connected or not with some contract; the object being that the party deceived should act upon it as true. The legal result is, that if the party so relying on its truth and acting on it suffer damage, he can sue the deceiver for such damage. It has sometimes been supposed that the deceit or misrepresentation must have reference to some contract, or arise out of some confidential relation between the parties, and that the party making it should have some private interest to serve; but this is a mistake; and recent cases have established, that if a person wilfully—i.e., either not knowing anything at all one way or the other about the matter, or knowing the facts, misrepresent something, with the intention that a stranger should act on such misrepresentation, and such stranger does so act on it, and suffer damage, then the right of action accrues to the deceived party. One remarkable exception to this doctrine, however, occurs in the case of the contract of marriage, where either party has in general no remedy whatever against the other for misrepresentations as to his or her property, connections, etc.; though there may be legal redress for an injured party in the case of a deceiver who by M. has prevented ascertainment of lack of chastity on the part of an intended wife, or of severe chronic disease in the case of either party to an intended marriage. It is not necessary that M. should be in writing to give ground for action, except in cases where the party gives representations as to the conduct, credit, ability, trade, or dealings of a third party, in order that such third party shall obtain credit, money, or goods, thereby. The doctrine of M. has acquired consequence of late, by the extension of the system of joint-stock companies, and the practice of the directors and officers publishing, or being parties to, fraudulent reports, accounts, and circulars as to the credit and stability of such undertakings. It is now settled, that not only every director, but every clerk in the service of the directors, who knowingly and wilfully concurs and takes a part in publishing or circulating such false reports, whereby strangers are led to believe and act on them, and thereby suffer pecuniary loss, is liable to an action of damages at the suit of such strangers. It is also a general rule affecting contracts (other than marriage), that M. in some material point bearing on the contract, and likely to induce the party to enter into such contract, will render the contract void; but in order to make M. of a minor sort have the same effect, the party

must warrant it as true; in which case, whether important or not, or whether wilful or not, a M. avoids the contract: this applies generally in contracts of life and fire insurance. Another important class of fraudulent misrepresentations, now brought within the criminal law to a large extent, is that of counterfeiting trade-marks: see TRADE-MARKS.

MISREPUTED, a. pp. *mĭs'rĕ-pū'tĕd* [*mis*, wrong, and *reputed*]: wrongly reputed.

MISRULE, v. *mĭs-rôl'* [*mis*, wrong, and *rule*]: to rule wrongly or badly: N. unjust rule; disorder; confusion. MISRU'LING, imp. MISRULED', pp. *-rôld'*. LORD OF MISRULE, the one who presided over Christmas sports.

MISS, n. *mĭs* [from *mistress*, arising from a contracted way of writing it]: a title of address conferred on young unmarried women, prefixed to the name, as *Miss* Brown or *Miss* Jane Brown: a young girl: a kept mistress. MISSES, n. plu. *mĭs'sĕz*. MISSY, n. *mĭs'sĭ*, a little miss. *Note.*—MISSES is (according to authorities generally) the plural of the noun MISS; in such an expression as *Miss Brown*, however, it is claimed by some that the word Miss is undoubtedly adjectival, and that the true plural form is therefore *Miss Browns*—on the ground that the expression *Misses Brown* is not only phonetically disagreeable, but also grammatically an adjectival character is assigned to *Brown*, the really significant name.

MISS, v. *mĭs* [Icel. *missa*, to lose: Dut. *missen*, to fail, to miss: Dan. *misse*, to wink or blink]: to fail in hitting or reaching, as a mark; to fail in obtaining, finding, or keeping; to discover something to be wanting; to perceive the want of; to mistake; to omit; to be wanting: N. loss; want; mistake. MISS'ING, imp.: ADJ. lost; wanting; absent: N. the act of failing to hit the mark; in *OE.*, disappearance; loss. MISSED, pp. *mĭst*.

MIS'SA DI VO'CÉ: in *singing*, the gradual swelling and again diminishing of the sound of the voice on a note of long duration.

MISSAL, n. *mĭs'săl* [F. *Missel*—from mid. L. *missālĕ*, Mass-book—from *missa*, the Mass, which see]: Roman Cath. ritual or Mass-book, the volume containing the offices used in celebration of the Mass. In the early western church, the Mass-book was called *Sacramentarium*, containing only a part of the present M. The volumes containing all the parts of service in high mass and low mass were called *Plenars*. Anciently, considerable variety in minor details prevailed among the books in use in different countries, and even in different churches of the same country. With the view of uniformity, the pope, in virtue of a decree of the Council of Trent, 1570, ordered that all churches which had not, for a clearly ascertained period of 200 years, had in uninterrupted use a peculiar service-book of their own, should thenceforth adopt the Roman M. Of this exemption, several churches in Germany, France, and even

in Italy, availed themselves; but in later times, the great majority have conformed to the Roman use. The Roman M. has twice since that date been subjected to revision and correction—1604 by Clement VIII., and 1634 by Urban VIII. The latter recension continues in use. The missals of the oriental rites differ from that of the Roman Church, each having for the most part its own proper form. See LITURGY.

MISSEEM, v. *mĭs-sēm′* [*mis*, wrong, and *seem*]: in *OE.*, to make a false appearance; to misbecome. MISSEEM′-ING, imp. misbecoming: N. a false appearance; disguise. MISSEEMED′, pp. *-sēmd′*.

MISSEL, n. *mĭs′sĕl:* a bird of the thrush kind—so called from feeding on the berries of the *mistletoe;* also called MISTLE-THRUSH.

MISSELTOE: see MISTLETOE.

MISSEND, v. *mĭs-sĕnd′* [*mis*, wrong, and *send*]: to send amiss or incorrectly. MISSENT′, pp. a. sent to the wrong or improper address.

MISSHAPE, v. *mĭs-shāp′* [*mis*, wrong, and *shape:* O. Dut. *misscheppen*, to misshape]: to give an ill form to; to shape ill. MISSHAPING, imp. MISSHAPED′, pp. *-shāpt′*. MISSHA′PEN, a. *-shā′pn*, ill-formed; ugly; deformed.

MISSILE, n. *mĭs′ĭl* [L. *missĭlĕ*, a missile—from *missĭlis*, that is thrown or cast—from *missus*, sent or thrown]: a weapon or thing thrown, or intended to be thrown, to hurt or injure, as a lance, a spear, a bullet, a stone. ADJ. that may be thrown or sent, as missile weapons.

MISSINNIP′PI RIVER: see CHURCHILL RIVER.

MISSION, n. *mĭsh′ŭn* [F. *mission*—from L. *missĭōnem*, a sending off—from *missus*, sent: It. *missione*]: state of being sent by authority on some special business; persons sent on some special business or with some particular object in view; purpose of life; message; a station of missionaries in a heathen country. In Rom. Cath. and other prelatical churches, a course of special Christian services held in a town or parish for a limited time, under the direction of the priest, but usually with the assistance of some one who has a gift for such services. It corresponds to the 'revival' in non-prelatical denominations. The themes are solemn; the preaching is pungent, earnest, practical, and awakening, presenting the fundamental truths of faith and repentance. A M. is held usually in Lent or in Advent. The prayers are sometimes extemporaneous, and the singing is generally congregational. In the Church of England, the M. has for years been largely developed and productive of great good: it has been introduced of late with wide acceptance in the Prot. Episc. Church in the United States. *Mission* in *OE.* is a discharge; a faction or party. MISSIONARY, a. *mish′-ŭn-ā-rĭ* [F. *missionnaire*]: pertaining to missions: N. one sent to preach the gospel to the heathen or the poor; one laboring to spread the gospel, especially among a

neglected population, in connection with some church or society. MISSIONER, n. *mĭsh'ŭn-ĕr*, for 'missionary,' in prelatical churches, a special preacher who conducts missions—analogous to a revivalist or 'evangelist.' MIS'-SIONARY-REC'TOR, n. the title given to certain Roman priests in each diocese in England, from their having charge of missions more than ordinarily important.—SYN. of 'mission': errand; deputation; commission; delegation; embassy.

MIS'SIONARY RIDGE, BATTLE OF: see CHATTANOOGA, BATTLE OF.

MIS'SIONS, CHRISTIAN: enterprises of the Church of Christ for the conversion of the nations to Christianity, by sending to them preachers and teachers called *missionaries*.

The first Christians used great zeal in preaching the gospel to the heathen; Christian teachers continued to go forth for this purpose into heathen countries until about the 9th c.; and though other and less worthy means were too often employed, the labors of Palladius in Ireland, of Columba in Scotland, of Augustine in England, of Gallus and Emmeran in Alemannia, of Kilian in Bavaria, of Millibrod in Franconia, of Swidvirt in Friesland, of Siegfried in Sweden, of Boniface in Thuringia and Saxony, of Adalbert in Prussia, of Cyril and Methodius among the Slavonians, and of many such early missionaries, were unquestionably very instrumental in the extension of Christianity in Europe. After the Reformation, the Rom. Cath. Church, roused to activity by its losses and dangers, not only sent forth missionaries to confirm its adherents in Protestant countries, and to win back Protestants, but also sought to repair its losses by new acquisitions from the vast domain of heathenism. With this view, the *Congregatio de Propagandâ Fide* was constituted by Gregory XV. 1622, and the *Collegium de Propagandâ Fide* (see PROPAGANDA) by Urban VIII. 1627; and a number of institutions, called *seminaries*, were established for training missionaries. Jesuit missionaries earnestly prosecuted their work among the Indians of S. America, from the middle of the 16th c. to the middle of the 18th, when they were expelled by the Portuguese and Spanish governments, because their political power had become too formidable. They are accused of administering baptism to pagans with too great readiness; but they were certainly successful in extending civilization among the Indians, particularly of Paraguay. Jesuit missions to India and Japan were founded hy Francis Xavier (q.v.) in the middle of the 16th c. In Japan, the missionaries made great progress at first; and in 1582 they boasted of 150,000 converts, 200 churches, and 59 religious houses of their order in that empire; but ere the middle of the 17th c., the whole work had been overthrown by severe and bloody persecution, and every missionary expelled. In China, similar

success was gained, followed by a period of persecution though the destruction effected was less complete than in Japan. The Rom. Cath. Church continued to exist in China, its missionaries and members enduring great hardships, and many of them evincing their sincerity even by their death. Christianity was finally forbidden and Christians sent into exile (1724) so that there were few converts in China at the opening of the 19th c. With the gradual opening of the Empire the propaganda was renewed so that there are not a few Rom. Cath. in China at the present day. In Abyssinia also, the Jesuits made much progress in the 17th c., and for a time attained great power in the country; but their interference in political matters led to their complete expulsion. In the 17th c., the Jesuits boasted of the vast success of their mission in Madura, a province of s. India; but it was found to be rather apparent than real, and to have been attained by a compromise of Christianity and the employment of unworthy means, so that, after long contests in the papal court, a decision was pronounced against the Jesuits, and their connection with Madura was dissolved in the middle of the 18th c. Rom. Cath. missions have from the first done much for the Indian tribes of N. America—especially on the Pacific coast, and in the more northern central and Atlantic regions. At the present day this work is not relaxed in vigor nor diminished in success.

For a long period after the Reformation, the Prot. Church seems to have been little sensible of the duty of laboring for the propagation of Christianity; nor was it until the 19th c. that missionary zeal began to be largely developed. In the middle of the 17th c. (1647), indeed, an act of the English parliament (the 'Long Parliament') established the *Society for Propagating the Gospel in Foreign Parts;* and in 1698 was established the *Society for Promoting Christian Knowledge.* A few missionaries from the early New England churches labored with zeal and success among the N. American Indians, in which field the names of Eliot and Mayhew are particularly distinguished in the 17th c., and that of Brainerd in the 18th; but the commencement of more systematic and continuous Prot. missionary enterprise may be reckoned from the establishment of the first Prot. mission to India, which did not take place till the beginning of the 18th c., when Bartholomew Ziegenbalg and another were sent thither by Frederick IV. of Denmark, and settled in a small territory, then belonging to Denmark, on the coast of Coromandel. The mission in s. India soon received the support of the English *Society for Promoting Christian Knowledge*, and was maintained and extended chiefly by that soc. during the whole of the 18th c. Among the missionaries in this field, the name of Schwartz is particularly distinguished; and his success, and the influence which he acquired in the country, were equally remarkable. He died in 1798. Since that time, the missionary work in s. India has been carried on with continued success by

numerous societies, European and American. Greater progress has been made there than in any other part of India: indeed, the work was not commenced in any other part till almost a century later.—The Moravian Church early entered on missionary enterprise, and was the first Prot. church which did so in its united or corporate character; and very successful missions of the United Brethren (Unites Fatrum) were planted in the 18th c. at the Cape of Good Hope, in the W. Indies, and in Labrador. Greenland had previously been the field of similar enterprise by missionaries from Norway. The mission to Greenland was founded by Hans Egede (q.v.) 1721, and has been maintained to the present day with such success that the greater portion of the Greenlanders have now been converted to Christianity, and much of the rudeness of their former life has disappeared.—Toward the close of the 18th c., some of the great missionary societies still existing in England were formed—the *Baptist Missionary Soc.* 1792, *London Missionary Soc.* 1795. About the same time, the *British and Foreign Bible Soc.* and the *Religious Tract Soc.* were formed, which have coöperated with all the missionary societies as most important auxiliaries. The *Baptist Missionary Soc.*, immediately after its formation, sent missionaries to n. India: Dr. Carey was one of its first, and also one of its most eminent (see CAREY, WILLIAM). India is now a field of labor for many missionary societies, not only of Britain, but also of the United States and of the continent of Europe. The *London Missionary Soc.* was at first composed of members from almost all Prot. denominations; but the formation of other societies, and the engagement of churches as such in more denominational missionary enterprise—e.g., the Wesleyan Meth. Church, the Presb. Church—have left this soc. now almost entirely to the English Congregationalists, who administer it in a liberal spirit and with much energy. It sent its first missionaries to the South Sea Islands, and the mission was maintained for about 16 years, amid many difficulties, without any apparent success; but its success was afterward great and rapid, first in Tahiti, later in other islands, so that now many islands of the South Seas are entirely Christian. The London Missionary Soc. soon entered other fields of labor, and now maintains missions to many parts of the world. In Madagascar amazing success has attended its work. One of the most important societies founded during the 19th c., the *Church Missionary Soc.*, formed by members of the Church of England, has sent forth missionaries to many fields. They have been particularly successful in New Zealand, Africa, and about Hudson's Bay; and they recently entered the Egyptian Sudan. The various churches in Scotland also support vigorous mission agencies. The late Dr. Livingstone, of the London Missionary Soc., explored vast regions in central Africa. Fired by his example, the friends of missions in Scotland subscribed £12,000 to found *Living-*

stonia, a memorial mission station on Lake Nyassa, under the management of the Free Church Foreign Missions Committee; and an expedition arrived there and established itself 1876. Various other missionary societies, Rom. Cath. and Prot., have selected stations in the region of the great lakes. The Wesleyan Methodists have missions in many parts of the world. They have been particularly successful in the Fiji Islands and in parts of w. Africa.

In the United States, the missionary societies rival those of Britain in magnitude and importance.—The *American Board of Commissioners for Foreign Missions* was formed by the Gen. Assoc. (Congl.) of Mass., at Bradford, 1810, the oldest soc. (for general misions) in the United States. It was formed by Congregationalists, but with a view to uniting the Presb. denominatons also in the great work—thus not on a denominational basis. The Reformed (Dutch) Church withdrew, to prosecute its missions as a separate organization, 1838; and the Presb. constituency of the Amer. Board likewise withdrew 1870—leaving the soc., like the London Miss. Soc., practically Congl., though holding unchanged its original undenominational basis. The Presb. Synod of Pittsburg formed a foreign missionary society in 1831 and sent workers to Africa and India but in 1870 all the work was united under the care of the General Assembly. One of the early enterprises of the Amer. Board was the mission to the Sandwich Islands, founded 1819, which has resulted in the general Christianization of these islands, and in their civilization to a degree which, considering the shortness of the time, is a notable achievement. The mission stations of the Amer. Board are in all parts of the world: specially notable has been their more than half-a-century of work in India. Their missions for many years in Turkey, and recently in Japan, have had great fruitfulness in gathering Christian converts and churches and are recognized by statesmen as of immense social, economical, and political importance, through their gift to the people of new ideals of human character and life.—The *American Baptist Missionary Society* has occupied Burmah and Farther India as one of its principal spheres of labor, and there its missionaries have had probably the most remarkable success recorded in missionary annals, in the Christianization and civilization of the people called Karens, and, within a few years, of other Indian peoples. The missionaries of the Prot. Episc. Church have brought great blessings to many of the Indian tribes in the far western States of America. The Miss. Soc. of the Meth. Epis. Church was formed in 1819. It has now flourishing work in India, China, Africa and other fields.

On the continent of Europe, the first Prot. missionary Soc. was that of Basel 1816; the next was that of Berlin 1823; and some of these have also maintained successful missions in heathen countries.—The most marked and

extensive success of missions, besides those above noticed, is in Madagascar where missionaries of the London Missionary Soc. early had the protection and favor of King Radama I., and the church planted by them continued to exist, notwithstanding most bloody persecution, and the martyrdom of tens of thousands of its members, during the next reign under a heathen queen. It is a wonderfully flourishing church at the present day, although the occupation of the island by France has hindered Protestant work and most of it has been transferred to the care of the Paris Missionary Society. The queen and her councilors became Christians and there are to-day immense Prot. churches at the capital city. In s. Africa, also, important results have been attained. Access has recently been obtained to China, and a number of Prot. churches and societies have entered energetically upon that field. Preparation had been previously made for this, by missionary labors among the Chinese in the Malay-Peninsula, and by the study of the language, the compilation of grammars and dictionaries, and the translation of the Bible into the Chinese language. Indeed, it must be reckoned as among the services rendered to mankind by Christian missionaries, in modern times, that they have not only translated the Bible and other religious books into many languages, but have reduced many barbarous tongues to writing, and have prepared grammars and dictionaries, thereby contributing not a little, independently of their highest aim, to the promotion of knowledge, civilization, and the welfare of the human race.—One of the important features of recent years in missionary work, is the formation, rapid growth, and large results of *Women's Missionary Societies:* these, not excluding the general work, devote their efforts mainly to reaching—with uplifting power—the benighted and wretched women of heathen lands. This work is one of great significance.

The progress of Christian missions to Mohammedan countries has hitherto been very small, though numerous converts from Mohammedanism, as well as from heathenism, have been made in India. Of late, some have thought they observed a movement among the Mohammedans of India, apparently tending toward Christianity; but at the same time there has been a new awakening of Mohammedanism itself in the Eastern Peninsula and the islands of the Malayan Archipelago. Missions to the Jews have for several years engaged not a little of the attention of some portions of the Christian Church, particularly in England and Scotland.

Christian missions have passed through the era of experiment, and are rapidly emerging from the cloud of suspicion or contempt which at first was cast about them. It is evident that if the rate of advance in the last decade, in three or four important national mission-fields, be continued, the decades will not be very many before Christ will have been preached in all the world.

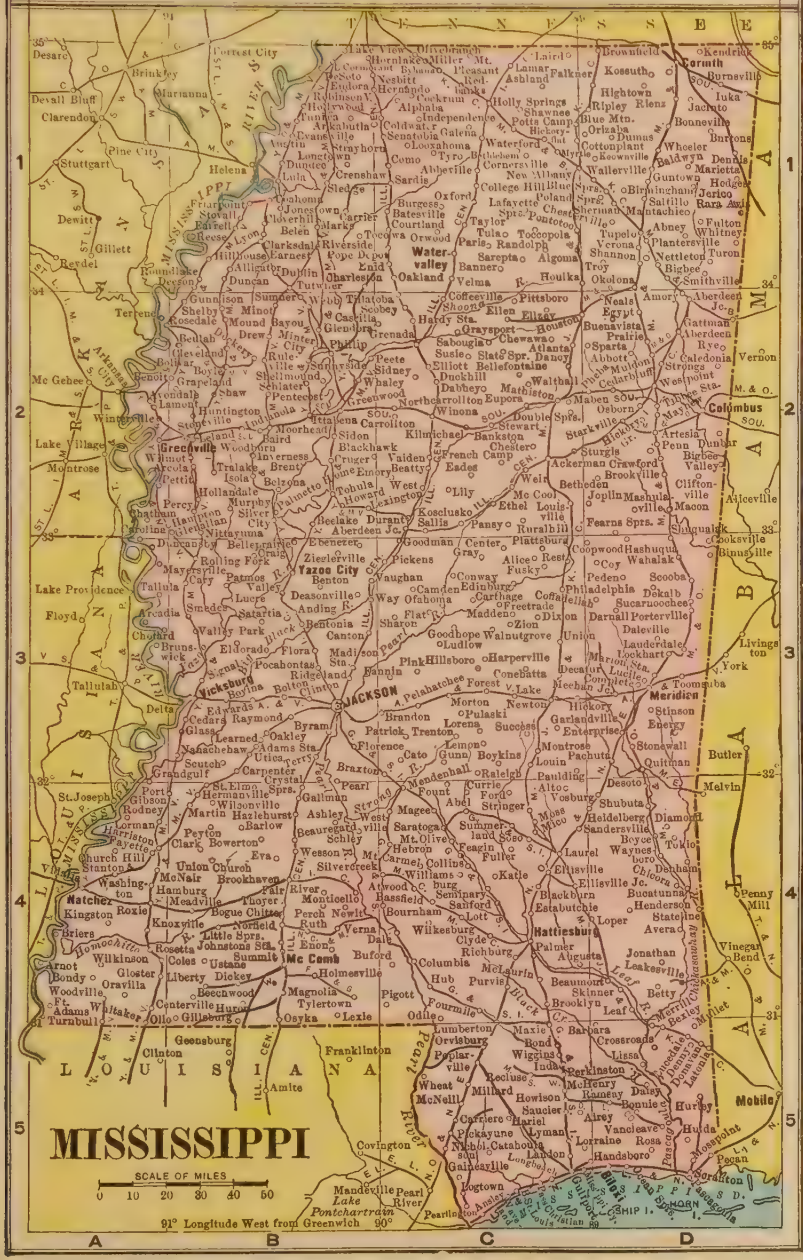
MISSISSIPPI, *mis-is-sip'i:* a state; one of the United States of America; 7th in order of admission into the Union; 18th in population 1880, 21st in 1890, and 20th in 1900; in 1902, 3d in production of cotton (1,451,626 bales) and 20th in corn. Popularly known as the 'Bayou State.' The name is Indian, meaning 'Father of Waters.'

Location and Area.—Mississippi is in lat. 30° 13′—35° n., long. 88° 7′—91° 41′ w.; bounded n. by Tennessee, e. by Alabama, s. by the Gulf of Mexico and Louisiana, w. by Louisiana and Arkansas; extreme length n. and s. 332 m., extreme breadth 189 m., mean breadth 142 m.; 46,810 sq.m. (29,958,400 acres); total gulf-coast 287 m.; greatest elevation 800 ft.; cap. Jackson.

Topography.—The surface is generally undulating, with numerous hills and a broad, low ridge extending n. and s. through the state, the whole face sloping gradually toward the Mississippi river and the Gulf of Mexico from the rugged limestone region in the n.e. East of the central ridge are broad tracts of fertile prairie, which yield large crops of corn and cotton, and w. are a number of valleys between low ridges that extend from the central ridge to the great Mississippi 'bottom,' or Yazoo basin, an elliptical area extending from Vicksburg n. to Tennessee, and embracing on the e. the valley of the Yazoo and Tallahatchee rivers. It is more than 50 m. wide in the centre, comprises about 4,000,000 acres, is swampy and frequently inundated, and is the centre of the cotton-zone of the state. 'Cane hills' or 'bluffs' occupy the country along the Mississippi river below Vicksburg, for 10 or 15 m., some of which are 150 ft. above the river; and a broad belt of timber-land with extremely fertile tracts extends along the river below the Yazoo delta, but, like the 'bottom,' is subject to overflow. Extensive marshes prevail at the mouths of the streams entering the gulf. The Mississippi river forms the western boundary for more than 500 m. by its windings, and the Tennessee river the northeastern boundary for 15 m. The main drainage is by the Mississippi river and its affluents, the Homochitto, Bayou Pierre, Big Black, and Yazoo rivers; the Sunflower, which connects the Mississippi with the Yazoo; the Tallahatchee and Yalabusha, which form the Yazoo; the Pearl and Pascagoula, with their branches, the Bogue Chitto, Leaf, and Chickasawha, which enter the gulf; and the Tombigbee, with its numerous affluents in the e. The Yazoo is navigable throughout, and its affluents for considerable distances; the Big Black is navigable by steamers for 50 m. above its mouth; the Pearl may be ascended by small boats for 100 m. from its mouth; and the part of the Tombigbee in Mississippi is navigable for 10 m. Large sums have been expended by the federal and state governments in building levees along the Mississippi river to prevent overflows; yet spite of annual

Area in Square Miles, 46,810. Population, 1,551,270.

Number of Counties, 77. Capital of State, Jackson.



strengthenings, breaks frequently occur leading to disastrous overflows, as in 1890, Mar. and Apr.

Climate.—The summers are long and hot; winters short, and colder than on the Atlantic coast in the same latitude; most temperate and agreeable climate from Oct. to July. Excepting the lowlands of the water-courses and the malarial 'bottom,' the state is generally healthful, with temperature at Vicksburg 47°—56° in winter and 80°—83° in summer, and rainfall at Natchez 54 in., along the coast 64 in., and average for the state 57¾ in. The rainfall is quite equably distributed through the year, insuring a marked uniformity in amount of agricultural products.

Geology.—The limestone formation of s.w. Tennessee extends a considerable distance in the n.e. corner of Mississippi, cropping out in massive walls on both sides the Tennessee river. This is succeeded, on the w., first by the cretaceous, then by the tertiary formations, the latter comprising 7 groups: the n. lignite, siliceous Claiborne, calcareous Claiborne, Jackson, Vicksburg, Grand Gulf, and coast Pleiocene. The quaternary or alluvial predominates in the 'bottom,' the lowlands of the Mississippi, Sunflower, and Yazoo rivers and their tributaries, and for a distance of 30 m. back from the gulf-coast. The orange sand, a notable feature of the geology of Mississippi, is found in various shades in different localities, and in some places is sufficient in mass and solidity to furnish substantial building-stone. The economic provisions are chiefly brown coal, mineral fertilizers, potters' and firebrick clay, and rotten limestone for burning. The mineral deposits are of slight consideration, though there are numerous medicinal springs of alkaline and saline chalybeates, containing iron, lime, magnesia, and some soda.

Zoology.—Wild animals are plentiful in the wooded districts, and include bears, foxes, wolves, wild cats, panthers, deer, and various small game—e.g., rabbits, squirrels, gophers, and wood-rats. Teal, brant, wild pigeons, wild turkeys, quail, mocking-birds, and rice-birds abound. The swamps and bottom-lands abound in lizards, water-snakes, rattle-snakes, and moccasins; and the bayous of the Mississippi river in alligators. The principal streams contain abundance of fish—e.g., giant cat-fish, buffalo-fish, black bass, pickerel, and many others common to n. waters; and oysters and other shell-fish are taken in large quantities from Mississippi Sound.

Agriculture.—In 1900, there were 220,803 farms, comprising 18,240,736 acres, of which 10,646,308 acres were improved and 7,594,428 were unimproved. The farm lands with buildings were valued at $152,007,000, the implements and machinery at $9,556,805, and the live stock at $42,657,222, a total of $204,221,027. In 1906, the principal crops were corn, 40,789,207 bushels, valued at $24,881,416; oats, 1,626,732 bushels, valued at $797,-

049; potatoes, 478,380 bushels, valued at $416,191; hay, 83,359 tons, valued at $954,461; tobacco, 66,000 pounds, valued at $19,008; rice, 21,720 bushels, valued at $19,-548; and cotton (1905), 1,229,845 bales, valued at $71,-641,190. Some wheat is grown, as are also peas, beans, peanuts and onions and garden truck, the combined value of all being about $6,000,000. Of fruits, apples and peaches produce about 250,000 bushels annually, and plums, prunes and pears are plentiful. The wool production in 1906 was valued at $206,712. In 1907, the farm animals comprised 257,295 horses, valued at $20,418,951; mules, 274,437, valued at $31,409,335; milch cows, 329,-669, valued at $6,923,049; other cattle, 600,950, valued at $5,468,644; sheep, 183,280, valued at $316,708; and 1,316,214 swine, valued at $6,252,016.

Manufactures.—In 1905, there were 1,520 manufacturing establishments in the state, capitalized at $50,256,-309; the average number of wage-earners was 38,690, and their wages amounted to $14,819,034; the material used was valued at $25,800,885; and the value of the products was $57,451,445. Lumber and timber products form the leading industry, being valued at $24,035,539, cotton-seed oil and coke being second, with a valuation of $12,587,147. Other valuable products are cotton goods, $2,462,808; turpentine and rosin, $2,365,720; lumber, planing mill products, $2,126,250; and oyster canning and preserving, $1,502,497. Meridian has the mill of largest capacity and Greenville the greatest number of establishments.

Commerce.—Mississippi has only one port of entry—Pearl river; the imports for the year ending 1906, June 30, were valued at $59,180; the exports for the same period at $6,037,723. Mississippi and Louisiana comprise one internal revenue district, and in 1906 the collections amounted to $5,692,160.41.

Transportation.—The total length of railroads within the state in 1906 was 3,708.24 miles. The most important lines are the Illinois Central, the Yazoo & Mississippi Valley, the Southern, the Louisville & Nashville, the Kansas City, Memphis & Birmingham, the Mobile & Ohio, the Alabama & Vicksburg, and the New Orleans & Northeastern. Vicksburg, Greenville, and Natchez are principal ports on the Mississippi river, and Pascagoula and Biloxi on the Gulf of Mexico. There are also 8 lines of electric railway, operating 55 miles of track.

Religion.—The Baptist Church claims over half the church population of the state, and then follows the Methodist Episcopal, South; African Methodist; Methodist Episcopal; Roman Catholic; Presbyterian, South; Cumberland Presbyterian; Disciples of Christ; and Protestant Episcopal. In 1900, there were 1,664 Evangelical Sunday-schools, with 11,967 officers and teachers, and 100,000 scholars.

Charities and Correction.—There is a state penitentiary

1. Library, University of Mississippi.
2. Lyceum Building, University of Mississippi.

at Jackson, where the prisoners are employed at farm labor. There are state hospitals for the insane at Jackson and Meridian. The State Deaf and Dumb Institute for white and colored, and the School for the Blind (white) are located at Jackson. There are hospitals supported by the state at Vicksburg and Natchez.

Education.—Nearly all the cities and towns of the state have well-appointed graded schools, the average session being 10 months; separate schools are maintained for the colored race. In 1905, there were 571,916 children of school age (5 to 18 years), the number of pupils enrolled was 403,647, and the average daily attendance 233,175. There were 3,028 male teachers and 5,894 female teachers, whose salaries aggregated $1,573,416; and the total expenditures were $1,868,544. There were 100 public high schools, 32 private secondary schools, 2 public normal schools, 1 private normal school, 4 coeducational universities and colleges, and for men only, 2 schools of technology; 10 colleges and seminaries for women, 1 school of medicine, and 2 law schools. The principal schools for higher and technical education are the State Agricultural and Mechanical College, at Agricultural College (1880); State Agricultural and Mechanical College, at Alcorn (1871); Mississippi College, at Clinton (Bapt. 1827); Rust University, at Holly Springs (Meth. Episc. 1867); Millsaps College, at Jackson (Meth. Episc., So., 1892); and the University of Mississippi, at University (1848). The institutions for the higher education of women are: Blue Mountain Female College (non-sect. 1873), Blue Mountain; Whitworth Female College (Meth. Episc., So., 1859), Brookhaven; Hillman College (Bapt. 1853), Clinton; Industrial Institute and College (non-sect. 1885), Columbus; Central Mississippi Institute (Presb. 1884), French Camp; Belhaven College (non-sect. 1894), Jackson; Meridian Female College (non-sect. 1903), Meridian; Stanton College (non-sect. 1894), Natchez; Chickasaw Female College (Presb. 1852), Pontotoc; and Port Gibson Female College (Meth. Episc., So., 1839), Port Gibson. The law schools are those of Millsaps College and the University of Mississippi; the latter institution also conducts the school of medicine; the public normal schools are at Sherman and Walnut Grove. Tougaloo University is an excellent private normal school.

Finances and Banking.—The bonded indebtedness of the state is $2,887,026. The assessed valuation in 1907 was: Real estate, $131,315,281; and personal property, $63,236,476; and the total assessed valuation was $222,847,525. The main source of income is a direct state property tax, which yields almost 85 per cent. of the total income; of the disbursements, 30 per cent. are for common school purposes and 15 per cent. for redemption of the state debt. In 1908, there were 29 national banks in operation, with combined resources of $19,911,315.73;

capital stock of $3,401,980; surplus of $1,391,950; and individual deposits of $9,995,000.47. There are 280 state banks, with resources of $59,653,456; capital stock of $12,022,648; surplus of $2,418,191; and deposits of $37,-460,903. There are no savings banks.

History.—Hernando De Soto (q.v.) and his Spanish companions are believed to have been the first European visitors to the region of the present state of Mississippi. They traversed the old Chickasaw country 1539, spent a year or more in the present Yazoo 'bottom,' reached the Mississippi river 1541, and separated on their leader's death 1542, without having made any settlements. In 1673, Jacques Marquette (q.v.) and Louis Joliet (q.v.), attempting to reach the mouth of the Mississippi river, made several temporary landings within the present limits of Mississippi; and 1682 Robert La Salle (q.v.) and the Chevalier de Tonti (q.v.) spent some time among the Natchez Indians while on La Salle's second expedition to the Mississippi mouth. Sixteen years after La Salle had taken possession of the region in the name of France, and called it Louisiana in honor of the king, Pierre le Moyne, Sieur d'Iberville (q.v.), received royal permission to attempt to colonize the new territory. With 200 French immigrants he entered Mobile Bay 1699, Jan. 1, discovered Pascagoula river, landed on Ship Island, and built a fort at the Bay of Biloxi, 80 m. e. of the site of New Orleans. Iberville ascended the Mississippi river as far as Natchez, returned to France, collected a second and larger colony, secured a military force, and built a fort and established a colony at Natchez (Fort Rosalie) 1716. The Biloxi settlement was soon abandoned, but the establishment of colonies at New Orleans, Haynes Bluff, the Bay of St. Louis, Pascagoula, and other points, attracted many immigrants and adventurers to the region. In 1718, all the colonies became subject to the company formed by John Law (q.v.) to carry out his great 'Mississippi Scheme'; and when that enterprise failed, the whole territory of Louisiana passed to the control of the Company of the Indies. Under this management, efforts were made to concentrate the strength of the French settlers in New Orleans, and, while that settlement began to attain importance, the smaller ones in Mississippi suffered from lack of attention and protection. In 1728, the new French government fomented trouble with the Choctaw and Natchez Indians, who hitherto had been friendly with the whites, and they and several smaller tribes united to drive the French from the entire territory. Fort Rosalie was attacked 1729, Nov. 29, and the other settlements in Mississippi about the same time; but the successes of the Indians were checked by a military force sent from New Orleans 1730. In 1733, the Company of the Indies surrendered its interests and control in the region to the French king, and when Gov. Bienville was reinstated he found the colonists involved in a bitter war

with the Chickasaw Indians, who as friends of the English had hated the French from their arrival. This war lasted several years, comparative peace prevailed 1743-52, and further trouble with the Indians broke out 1752. The part of Louisiana including what is now Mississippi was ceded by France to Great Britain 1763, and for several years the principal settlers were the English from the Atlantic coast colonies. The U. S. government, having succeeded to the rights of the English in the region, formed the territory of Mississippi 1798, Apr. 7. It was then bounded n. by a line drawn e. from the mouth of the Yazoo river to the Chattahoochee, e. by the Chattahoochee, s. by the 31st parallel, w. by the Mississippi river. 1804, Mar. 27, a portion of the region ceded to the government by Georgia was added, making the territory comprise the present states of Alabama and Mississippi n. of the 31st parallel; and the part s. of that parallel, between the Pearl and Perdido rivers, was incorporated 1812, May 14. In 1817, Mar., Alabama was separated from Mississippi territory, and, in Dec. following, Mississippi was admitted into the Union as a state. The first constitution was in force till 1832, when a second was adopted. On the election of Pres. Lincoln 1860, a state convention was called, which adopted an ordinance of secession 1861, Jan. 9, and ratified the constitution of the Confederacy Mar. 30, without submitting the question to popular vote. The state promptly furnished its quota of troops for the Confederate army, and during the civil war suffered severely, particularly in the n. counties. Biloxi was captured by federal troops and a battery was removed from Ship Island 1861, Dec. 31; the battle of Shiloh was fought near the Mississippi border, after which the Confederates retired to Corinth, which was captured by the federal troops 1862, May 30; a battle was fought near Iuka Sep. 19; the Confederates attacked Corinth, but were repulsed Oct. 3, 4; Vicksburg was captured by the Union army, after important military operations and a remarkable siege, 1863, July 4; the capital was captured by the Union army; and, among others, two raids were made on Meridian. After the close of the war, the state authorities undertook to reorganize the state government, but Pres. Johnson appointed William L. Sharkey provisional governor, and he called a convention, which amended the state constitution by abolishing slavery 1865, Aug. 21, and repealed the ordinance of secession the following day. State officers, congressmen, and a legislature were elected Oct. 2, and U. S. senators on the meeting of the legislature; but neither senators nor congressmen were admitted to their seats. During the reconstruction period, the state was under the military command of Gens. E. O. C. Ord, A. C. Gillem, Irvin McDowell, and Adelbert Ames. It was readmitted to the Union 1870, Feb. 23, and the state authorities assumed control Mar. 10, following.

Government.—The executive authority is vested by the constitution of 1890 in a governor elected for 4 years; the legislative in a general assembly, comprising a senate of 45 members, and a house of representatives of 145 members; salary of each $400 per annum, biennial sessions; and the judicial in a supreme court, comprising a chief-justice and 2 associate justices appointed by the governor for 9 years; a circuit court in each of the judicial districts, each with a single judge appointed for 6 years; a chancery court in each chancery district, each with a chancellor appointed for 4 years, and justices of the peace elected for 2 years. There are also lieutenant-governor, secretary of state, treasurer, auditor, attorney-general, superintendent public education, commissioner of agriculture, land commissioner, adjutant-general, and librarian. By the constitution, treason, murder, and arson committed in the night are punished with death; married women may convey and devise property belonging to them at the time of marriage or acquired subsequently, are not liable for debts of their husbands, and may do business as if unmarried; the state cannot become a stockholder in any corporation or association, nor pledge nor lend its credit to any corporation, association, or individual; no one who denies the existence of a Supreme Being, or who is not a qualified elector, can hold office; and the chief grounds of divorce are adultery, sentence to penitentiary, desertion for two years, habitual drunkenness, and cruel treatment.

The successive governors, with their terms of service, are as follows: *Territory*—Winthrop Sargent 1798-1802; William C. C. Claiborne 1802-05; Robert Williams 1805-09; David Holmes 1809-17. *State*—David Holmes 1817-19; George Poindexter 1819-21; Walter Leake 1821-25; David Holmes 1825-27; Gerard C. Brandon 1827-31; Abraham M. Scott 1831-33; Hiram G. Runnels 1833-35; Charles Lynch 1835-37; Alexander G. McNutt 1837-41; Tilghman H. Tucker 1841-43; Albert G. Brown 1843-48; Joseph W. Matthews 1848-50; John A. Quitman 1850-1; John J. Guion (acting) 1851; James Whitfield 1851-2; Henry S. Foote 1852-54; John J. MacRae 1854-58; William McWillie 1858-60; John J. Pettus 1860-62; Jacob Thompson 1862-64; Charles Clarke 1864-5; W. L. Sharkey (provisional) 1865-6; Benjamin G. Humphreys 1866-70; James L. Alcorn 1870-1; Ridgley C. Powers 1871-74; Adelbert Ames 1874-76; John M. Stone 1876-82; Robert Lowry 1882-90; John M. Stone 1890-96; A. J. McLaurin, 1896-1900; A. H. Longino 1900-04; J. K. Vardaman 1904-8; E. F. Noel 1908-.

Politics.—State, congressional, and presidential elections are held Tuesday after first Monday in Nov. Idiots, insane, and criminals are excluded from voting. The state government is wholly democratic as to state officers and nearly so as to the legislature. Mississippi has 10 electoral votes. Her votes for president and vice-president have been as follows: 1820, James Monroe and

Daniel D. Tompkins, 2 each, 1 vacant; 1824, Andrew Jackson and John C. Calhoun, 3; 1828, Andrew Jackson and John C. Calhoun; 1832, Andrew Jackson and Martin Van Buren, 4; 1836, Martin Van Buren and Richard M. Johnson; 1840, William Henry Harrison and John Tyler; 1844, James K. Polk and George M. Dallas, 6; 1848, Lewis Cass and William O. Butler; 1852, Franklin Pierce and William R. King, 7; 1856, James Buchanan and John C. Breckinridge; 1860, John C. Breckinridge and Joseph Lane; 1864, no vote; 1868, no vote; 1872, U. S. Grant and Henry Wilson, 8; 1876, Samuel J. Tilden and Thomas A. Hendricks; 1880, Winfield S. Hancock and William H. English; 1884, Grover Cleveland and Thomas A. Hendricks, 9; 1888, Grover Cleveland and Allen G. Thurman, 9; 1892, Grover Cleveland and Adlai E. Stevenson, 9; 1896, William J. Bryan and Arthur Sewall, 9; 1900, William J. Bryan and Adlai E. Stevenson, 9; 1904, Alton B. Parker and Henry G. Davis, 10.

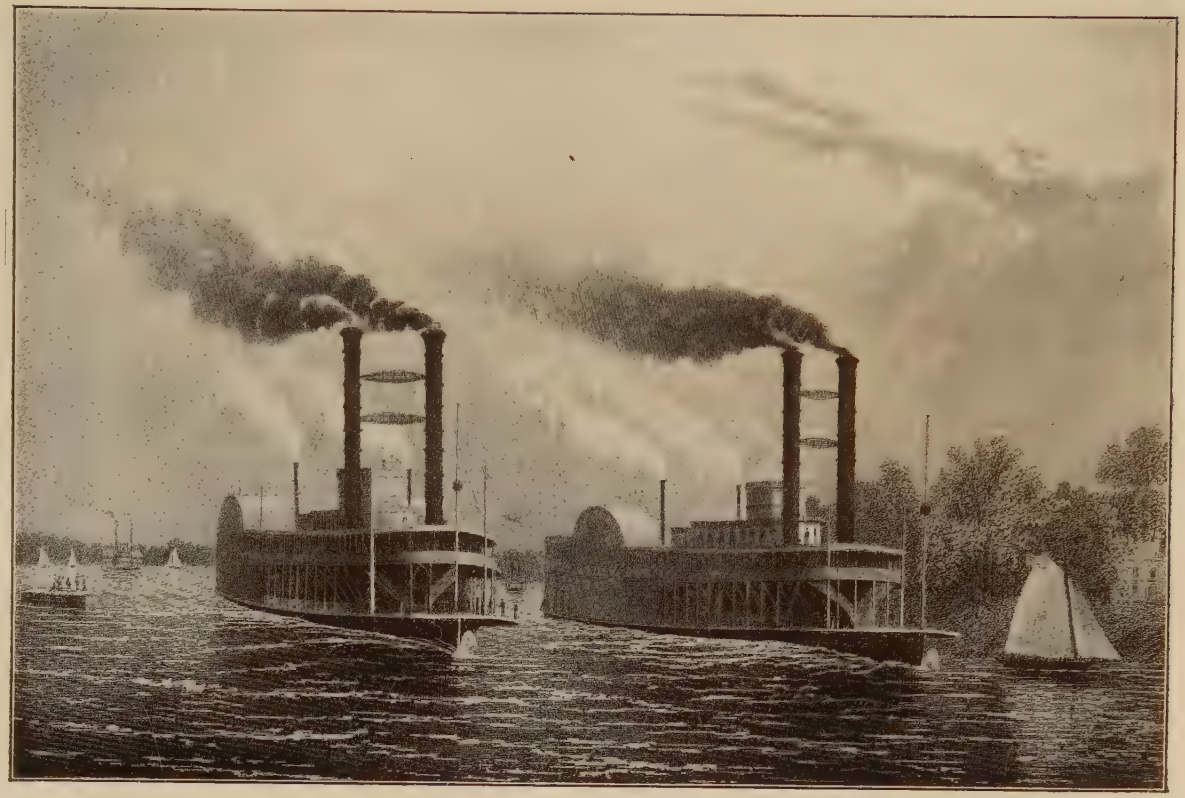
Population.—(1800) white 5,179, free colored 182, slave 3,489, total 8,850; (1810) white 23,024, free colored 240, slave 17,088, total 40,352; (1820) white 42,176, free colored 458, slave 32,814, total 75,448; (1830) white 70,443, free colored 519, slave 65,659, total 136,621; (1840) white 179,074, free colored 1,366, slave 195,211, total 375,651; (1850) white 295,718, free colored 930, slave 309,878, total 606,526; (1860) white 353,899, free colored 773, slave 436,631, total 791,305; (1870) white 382,896, free colored 444,201, total 827,922; (1880) 1,131,597; (1890) 1,289,000; (1900) 1,551,270.

Bibliography.—Claiborne, *Mississippi as a Province, Territory and State* (1889); Davis, *Recollections of Mississippi* (1889); Duval, *History of Mississippi* (1892); Garner, *Reconstruction in Mississippi* (1901); Goodspeed, *Memoirs of Mississippi* (1891); Hurt, *Mississippi: Its Climate, Soil and Production* (1883); Hilgard, *Report on the Geology and Agriculture of Mississippi* (1860); Lowry and McCarsle, *History of Mississippi* (1891); Monette, *History of the Mississippi Valley* (1848); Mayes, *Educational History of Mississippi* (1891); Rozier, *History of Early Settlements in the Mississippi Valley* (1890); Tracy, *Mississippi As It Is* (1895); Wall, *The State of Mississippi* (1879); Winsor, *The Mississippi Basin* (1895).

MISSISSIPPI AGRICULTURAL AND MECHANICAL COLLEGE: founded in 1880, at Agricultural College, Miss. The courses offered are the agricultural, engineering, textile and pedagogical, leading to the degree of B.S. and M.SC. There are a preparatory department and a summer school. Women are admitted to all courses. The experiment station is connected with the college, and receives special Federal appropriation. The college was endowed by the Federal land grants of 1862 and 1890, and receives also state and Federal appropriations. The total number of students in 1907 was 1,378; the faculty numbered 56.

MISSISSIPPI RIVER: chief river of N. Amer. and greatest artery of internal commerce in the world, involving a system of 35 rivers, to which it is the trunk, and 15,000 m. of inland navigation, with the drainage of a vast breadth of the United States, 1,147,000 sq. m., between the Alleghany and Rocky Mts. The chief upper branches of the system are the Missouri river on the n.w., with drainage area of 518,000 sq. m.; the Ohio on the n.e., with drainage area of 214,000 sq. m.; and the upper M., with drainage area of 169,000 sq. m. The respective lengths of these three are—Missouri 2,908 m.; Ohio 1,265 m.; upper M. 1,330 m. (above the mouth of the Missouri). It thus appears that the upper M. is hardly more of a stream than the Ohio, and that it and the Ohio together do not nearly equal the Missouri. The turbid water of the trunk stream, moreover, from its mouth n. for 1,286 m., is found to be continuous with the water of the Missouri, and not with the clear water of the upper M. The true river, in fact, which opens a water-course n. 2,200 m., to the falls of St. Anthony, and into the n.w. 3,860 m., to the Great Falls of the Missouri, would be properly known as the Missouri, if volume, length, and the character of the stream dictated the name. The fact of continuity of direction with the trunk stream, from the Gulf n., has caused the upper M. to be viewed as the extension of the trunk, and entitled to give its name to the whole stream.

The earliest European discovery of the M. was by De Soto, 1541, June, not far from the site of Helena, Ark. Marquette and Joliet descended the Wisconsin river to the M., which they entered 1673, June 17, and sailed down nearly to the Gulf. La Salle entered it from the Illinois river 1682, and descended to the Gulf. He set up a column there, with the Fr. arms, 1682, April 9, and claimed possession, for the Fr. king, of the vast territory reached by the great river and its branches. The highest source of the upper M. was fixed by Schoolcraft's explorations, 1832, in Lake Itasca (q.v.), from which the river issues in a stream 10 or 12 ft. wide and 18 in. deep. Later explorations carried the highest point two m. or more beyond, or s. of, Itasca, and Capt. Willard Glazier, 1881, July 22, reached a higher smaller head-water which he named Lake Glazier (q.v.), from which a stream flows n. a mile or two into Itasca. Explorers since, however, have asserted that Capt. Glazier mistook the long-known Elk Lake for a new discovery. He estimated this to be 1,582 ft. above sea-level, and 5,184 m. from the mouth of the M. Col. H. L. Abbot's estimate of the distance between the mouth and source of the M. is 2,616 m: the elevation of the source he puts at 1,680 ft. Hopewell Clarke, long a land-explorer for the N Pacific R.R. Co., was chief of an exploring expedition to discover the sources of the M. 1886. Its results are given in *Science*, VIII. (1886, Dec. 26). They show that Nicollet's creek is far the largest affluent of Itasca, contributing about three-fourths of the regular perennial inflow: it is



ON THE MISSISSIPPI.

also the longest—its windings being taken into account: it is also the most elevated—having been traced beyond what Nicollet saw of it, to a little lake 92 ft. above the level of Lake Itasca: thus, as Nicollet says—'This creek is truly the infant Mississippi.' Its head is in a narrow lake about half-a-mile long, whose head is in the n.w. of quarter-section 34, tp. range 143. Out of this lake the stream flows northward, 18 inches wide, 12 inches deep. The locality is in that part of Minn., Becker co., lat. 47° 10′ n., long. 95° 2′ w., which is very near the centre of the continent, and where the three greatest river systems of N. Amer. originate: that of the Red river of the north, that of the great lakes and the St. Lawrence, and that of the M. At the extreme head-waters of the Missouri, the M., and the Ohio, water falling on a single sq. m. may take opposite courses to the sea. The course of the M. from Itasca is e. of n., but, as it proceeds, a circuit is entered upon, going generally e., but with large bends and a very devious stream, through Bemidji, Cass, and Winibigoshish lakes, which are the most n. head-waters of the great river; thence s.e., past the falls of Pokegama, to a point where Swan river enters, 998 m. above the mouth of the Missouri; thence s. for some distance, to a point opposite to the w. end of Lake Superior; and thence s.w., to a bend back toward the e., where the circuit ends, and from which the river begins the long stretch, generally s.e., from abt. 130 m. above St. Paul to a turn s.w., at a point half-way between Dubuque and Rock Island, and w. of Chicago, distant 138 m. Just at the end of its great circuit, and at the head of its long s.e. stretch, the river receives a branch almost as large as itself, the Crow Wing river, which brings in from the n.w. a drainage corresponding to that gathered by the M. from the n.e. and n. The M. is wholly within Minn. for 663 m., and is its w. boundary for 134 m. further. Of this 797 m., navigation extends 540, with the break at the falls of St. Anthony. These falls have a single descent of 18 ft. only, over a sandstone cliff; but with rapids both above and below, the descent is 65 ft. within three-quarters of a mile. A line of steamers above the falls runs to St. Cloud, 86 m., and very much further when high water favors. Below the falls, navigation is regular through 2,200 m. to the Gulf. The Rock Island rapids, 14 m. in length, next above the cities of Rock Island and Davenport, and the Des Moines rapids, 130 m. lower down and 12 m. long, have required elaborate improvement to secure good navigation. For the season of low water, the entire upper M. is, in fact, difficult for boats, on account of the frequent sand-bars. The upper M. is joined by the larger and turbid Missouri, 1,286 m. above the Gulf of Mexico, 189 m. above Cairo, at the mouth of the Ohio, and 16 m. above St. Louis. It proceeds abt. 159 m. further, to the head of the broad alluvial basin which extends thence to the Gulf, and which greatly alters the character of the stream. This basin of broad bottom-lands has an average width of 50 or 60 m., and a length of 500 m. The

great river winds back and forth across it so much as to have a channel length of 1,097 m. The head of the basin is 30 m. above Cairo; and the gateway by which the river enters the basin is a gap of 8 or 10 m. in length, through a spur of the Ozark range of mts. This spur lies across s. Ill., and across the courses of the two great rivers which meet at Cairo, the M. and the Ohio. In a remote geological age, before the great bottom-lands had been made by the deposit of alluvium, an arm of the sea reached from the present Gulf of Mexico to the head of the present alluvial basin, and at that time the waters of immensely greater streams than the M. and the Ohio, poured over the Ozark barrier in cataracts vastly greater than anything now known. The channel by which the M. now flows through the Ozark Mts. has a rocky descending bed, cut by the stream, and forming the last of the rapids in the M. There are alluvial bottom-lands above the Ozark limit of the great basin of the lower M. They extend as far as 40 or 50 m. above the mouth of the Missouri river, with a width of 6 to 40 m. The Amer. bottom. on the Ill. side, extends down from the mouth of the Missouri for nearly 100 m., with an average breadth of 6 m. Below the mouth of the Ohio, the bottom-lands are low and liable to very wide overflow in flood seasons. The channel of the river is cut through them by the stream itself, in a very winding and changing course. On the w. of the channel, the bottoms, with a single exception at Helena, Ark., are continuous for 500 m., and 50 or 60 m. wide, the greater part of the area being still unreclaimed swamp of extremely rich soil. The Arkansas and the Red rivers are very large tributaries on that side. On the e. side the bluff formation which bounds the alluvial bottoms is occasionally reached by the river channel, which then has a shore from 100 to 300 ft. above the stream, as at Columbus in Ky., Randolph and Memphis in Tenn., Vicksburg, Grand Gulf, and Natchez in Miss., and Baton Rouge in La. With the few exceptions named, a belt of alluvial bottom extends from Cairo to Memphis, and a little lower down begins the great Yazoo basin or Mississippi bottom, an elliptical area of rich lowlands, 360 m. long, to near Vicksburg, and midway of its length 60 m. wide. The cut of the channel is that of a trough, which grows narrower and deeper as we descend the stream. At St. Philip, 37 m. from its mouth, the width is 2,470 ft.; at Carrollton, 84 m. higher up, and on for 123 m. to Baton Rouge, it is 3,000 ft.; for the next 400 m. up the river the width is 4,080; and thence to Cairo, 450 m., it is 4,470 ft. In the upper stream, beyond the Ozark, the width at various points is: below the mouth of the Missouri 3,800 ft.; at the falls of St. Anthony, 1,200 ft.; at Cass Lake 172 ft.; at Bemidji Lake, its most n.w. headwater, 120 ft. The depth at the falls of St. Anthony is 30 to 40 ft.; at the mouth of the Missouri 80 ft.; at the mouth of the Ohio 87 ft.; from the mouth of the Arkansas to the mouth of the Red river 96 ft.; and below Red river 121 ft. The average depth is augmented by floods, 37 ft.

at St. Louis; 51 ft. at Cairo; 47 at Columbus; 40 at Memphis; 51 at Natchez; 31 at Baton Rouge; 14½ at Carrollton, near New Orleans; 4½ at St. Philip; and less than 2½ at the head of the Passes into the Gulf. A variation from the average width takes place commonly in the large bends, which may become 1 m. or more wide, and there are long reaches of the river where extreme width gives shallow water, shoals, and bars, and bad navigation. A large number of islands occur in the stream, and these are known by numbers, from 1 to about 100. The lower end of the alluvial plain of the M. is a large delta protruded far into the Gulf of Mexico, through which the river finds several channels or Passes to the Gulf, the principal and most direct, the S. Pass, being 17 m. long. It is here especially, and for some distance up the stream, that bars most seriously obstruct navigation. The extent and peculiarity of the windings of the channel, from Cairo to the head of the delta, constantly bending back and forth, and making long loops where it goes round 25 or 30 m. only to return almost to the same point, could have been made only by a rapid and powerful current, irresistibly digging its way along the lines of lowest level and least resistance. With such a current carrying a vast amount of sediment, the channel may anywhere fill up sufficiently to turn the digging power into one or the other bank, or through the neck formed by a large loop, and at once a new course is swiftly made. When loops are cut off, their inlet and outlet are soon banked across by the sediment thrown down at the edges of the stream, thus leaving the cut-off bend of the old channel in the form of a crescent lake, great numbers of which occur on the w. side of the present channel. At the mouths of streams entering the channel of the lower M., drift materials are often thrown into a compact mass miles in length, across and on either side of the tributary mouth, making a bridge on which soil will gather and trees grow, as in the nearly contiguous examples at the mouth of the Red river and the passage from the M. to the Atchafalaya. The last was removed in 1835, after it had been growing for 60 years, and had become 10 m. long, 600 ft. wide, 8 ft. deep, and solid enough to have trees growing on it 60 ft. high. The Red river-raft had become 45 m. long, before it was successfully attacked, 1872, and broken through by some years of costly labor. The waters of the M. are pure and clear to the mouth of the Missouri, where they become whitish muddy. The Ohio adds a greenish tint, and the Arkansas and Red rivers that of their red ochreous sediment. Soil, sand, and gravel from the constantly falling banks, are carried along by the current, and thrown down in the bends and eddies of the stream, in many cases forming obstructive bars, while great trees torn from their place on the banks are left in mid-channel, their roots planted on the bottom and their tops pointed directly in the way of steamers ascending the river. Only by continual care are these dangerous snags kept out of the way of navigation. The

ancient normal working of the river built up its banks on either side above the level of the alluvial plain, and the forest or sod growth gave these banks comparative permanence, such as even the modern levees do not secure, unless made as nearly as possible like the natural. The earliest artificial levee, a m. in length, was made at New Orleans, 1717, by the engineer De la Tour, to protect the infant settlement. 20 m. below and 30 m. above were settled by 1770, and by 1828 the levees were continuous nearly to the mouth of Red river. In 1850–1 congress made grants of land to the states interested, and provided for a ten-years' survey, which resulted, 1861, in the *Report upon the Physics and Hydraulics of the Mississippi River*, by A. A. Humphreys and H. L. Abbot, on the basis of which all subsequent efforts of improvement have been made. This report established the fact that the digging power of the current at flood could be depended on to open an adequate way, if by effective levees the vast volume of water were kept in its proper course. On this principle the perfect completion of all necessary levees is demanded, as protection for bottom-lands in danger from floods; and on the same principle was carried out, by means of Jetties (q.v.), after the plans and under the direction of Capt. James B. Eads (q.v.), a most effective opening of a channel 30 ft. deep and 350 ft. wide, through the S. Pass into the Gulf, where before there existed a bar of sand and silt, with only 8½ ft. in depth of water. The chief shoals in the M. are on six extensive reaches, of which the Plum Point and Lake Providence are the worst. The former lies between Cairo and Memphis, extending 38 m. from Island No. 26 to Randolph, where the river widens in places to 10,000 ft., with a minimum depth of 4½ ft. The Lake Providence reach extends 25 m., from Skipwith's Landing, La., to the foot of Island No. 95. For such reaches of bad navigation a complete remedy is found in narrowing the channel by means of Dikes (q.v.), and by revetments protecting endangered banks from caving. It has been estimated that a continuous low river channel, with a minimum depth of 10 ft. on all shoals and bars, could be secured, from Cairo down to the head of the Passes, by the expenditure of $34,000,000. The alluvial deposits which were once carried as sediment by the sea-like river of geological times, and now fill the basin 50 or 60 m. wide, between the bluff formations which were the earliest banks of the flood, are 25 to 60 ft. in depth. The entire theory on which the levee system rests is questioned by a few investigators, who consider that levees tend to raise the whole bed of the river rather than to lower it.

MISSISSIP'PI SCHEME: gigantic commercial scheme, projected in France by John Law (q.v.), of Lauriston, 1717; collapsed 1720. Its primary object was to develop the resources of the province of Louisiana and the country bordering on the Mississippi, a tract at that time believed to abound in the precious metals. The company was incorporated 1717, August, under the designation *Company of the West*, and started with a capital of 200,000 shares, of 500 livres each (somewhat less than $100). The company obtained the exclusive privilege of trading to the Mississippi, farming the taxes, and coining money. The prospectus was so inviting, that shares were eagerly bought; and when, 1719, the company obtained the monopoly of trading to the E. Indies, China, the South Seas, and all the possessions of the French E. India Company, the brilliant vision opened to the public gaze was irresistible. The *Company of the Indies*, as it was then called, created 50,000 additional shares, but a rage for speculation had seized all classes, and there were at least 300,000 applicants for the new shares, which consequently rose to an enormous premium. Law, as director-general, promised an annual dividend of 200 livres (nearly $40) per share, which, as the shares were paid for in the depreciated *billets d'état*, amounted to an annual return of 120 per cent. The public enthusiasm rose to absolute frenzy, and Law's house, and the street in front of it, were daily crowded with applicants of both sexes and of all ranks, who were content to wait for hours, nay, for days together, to obtain an interview with the modern Plutus. While confidence lasted, a factitious impulse was given to trade in Paris; the value of manufactures was increased fourfold, and the demand far exceeded the supply. The population is said to have been increased by hundreds of thousands, many of whom were glad to take shelter in garrets, kitchens, and stables. But the regent had meanwhile caused the paper circulation of the national bank to be increased as the M. S. stock rose in value, and many wary speculators, foreseeing a crisis, had secretly converted their paper and shares into gold, which they transmitted to England or Belgium for security. The increasing scarcity of gold and silver becoming felt, a general run was made on the bank. The M. S. stock now fell considerably, and despite sundry desperate efforts, which had momentary success, to keep up its credit, it continued to fall steadily and rapidly. 1720, Feb., the National Bank and the Company of the Indies were amalgamated; but though this gave an upward turn to the share-market, it failed to put the public credit on a sound basis. Several useless attempts were made to mend matters; and those suspected of having more than a limited amount (fixed by a law passed at the time) of gold and silver in their possession, or of having removed it from the country, were punished with utmost rigor. The crisis came at last: 1720, July, the bank stopped payment, Law was compelled to flee the country, and a

share in the Mississippi Scheme with difficulty brought 24 livres (less than $4.50). An examination into the state of the accounts of the company was ordered by government; much of the paper in circulation was cancelled; and the rest was converted into 'rentes' at an enormous sacrifice.

MISSISSIP'PI SOUND: arm of the Gulf of Mexico, extending across from Mobile Bay to near New Orleans. It is cut off from the n. side of the Gulf by a chain of long islands—Dauphin, Petit Bois, Horn, Ship, Cat, and Isle au Pied. They are sandy and wooded, and Cat is fortified. These islands afford sheltered harbors, and good sailing between their n. shores and the mainland. The gateway of the Mississippi Sound into Mobile Bay is by Grant's Pass, and vessels reach New Orleans by way of Lake Pontchartrain. Lake Borgne, toward the w., is entered from the Sound at St. Joseph's Island.

MISSISSIPPI, UNIVERSITY OF: the state university, chartered in 1844 and first opened in 1848, situated near Oxford. During the civil war (1861-5) all exercises were suspended, and two members of the faculty appointed custodians of the university property. In 1872, the present organization in separate schools with optional studies was adopted, and courses leading to other degrees besides bachelor of arts were offered; in 1881, the law school was established. There are, therefore, now two departments: (1) the Department of Science, Literature and Arts; (2) the Department of Professional Education. The first includes 25 schools grouped into distinct courses or lines of study, providing instruction in the languages, history, science, mathematics, political economy, philosophy, pedagogy, and engineering; the degrees conferred are bachelor of arts, bachelor of science, bachelor of philosophy, bachelor of pedagogy, bachelor of mining engineering, bachelor of electrical engineering, and bachelor of civil engineering; there are also post-graduate courses in this department leading to the degrees of master of arts and doctor of philosophy. The second department included in 1903 only the law school. In 1900, the summer term of the university was begun. In 1882, women were admitted to all classes upon the same conditions as men, but were not allowed to lodge on the campus; in 1902, a special home for women students was erected. In the same year additional dormitories were built for men. The library has a special building of modern architecture, and numbers 17,000 volumes; there is also a law library of about 2,000 volumes in the law building. Until 1880 the university was supported by annual appropriations of the legislature; since that time the income has been derived from the federal grant of land, a second township being added to the original grant in 1894; the state has given occasional appropriations for buildings and improvements. The students number about 250 annually, the faculty 13.

MISSIVE, n. *mĭs'sĭv* [F. *missive*, a letter—from L. *missus*, sent: It. *missiva*, a missive]: a letter sent; a message. In Scotch law, a memorandum (see MINUTE; LETTERS): ADJ. intended to be sent; prepared for sending out. LETTER-MISSIVE (see COUNCIL, in Congl. Church Usage).

MISSOLONGHI, *mĭs-sō-lŏng'ghē*, or MESOLONGHI, *mē-:* small town of Greece, govt. of Ætolia, on the n. shore of the Gulf of Patras, 24 m. w. of Lepanto. It is memorable chiefly for the two sieges which it underwent during the war of independence. In 1822, it was invested by land and sea by the Turks, who, after a siege of two months, were compelled to withdraw. In 1826, it was again besieged by an overwhelming Ottoman force; and after ten months of resistance and suffering, its garrison, reduced from 5,000 to 3,000 fighting men, cut their way through the ranks of the enemy, carrying with them a great number of the women and children. The Turks then entered the town, which was almost totally destroyed. Here Lord Byron died 1824. Pop. over 6,000.

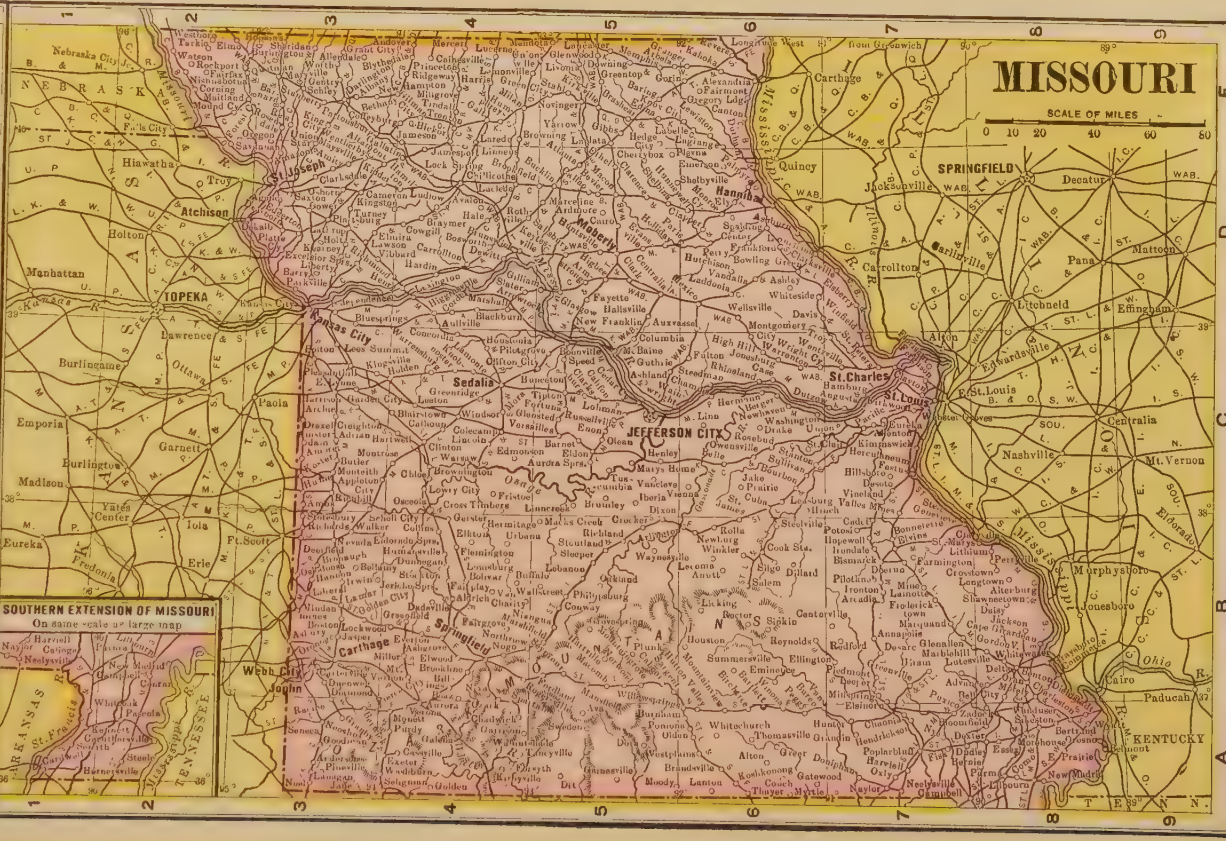
MISSOULA, *mĭ-zō'la:* Montana, city, county-seat of Missoula county; situated on both sides of the Hell Gate river, a tributary of the Columbia river, and on the Northern Pacific railway, in a beautiful and fertile valley, called by the early settlers Hell Gate Ronde. The city has an elevation of 3,201 feet above sea level, and is situated in 46° and 52′ north latitude, and in longitude 113° and 50′ west. The climate is salubrious, the winters being mild, and the summer and fall delightful. The average annual rainfall is about 16 inches. The city was founded in 1864, the first house, a log cabin, being built that year. The pioneer merchants of Missoula were Worden & Co., who built, in 1865, grist and saw mills, and erected and opened a store. The place at that time was called Missoula Mills, which name it retained for several years, when it was changed to Missoula. In 1883, the city was incorporated by an act of the legislature, having a mayor and city council. It is situated in the centre of a fine agricultural, fruit and lumbering region, and a large mining region is tributary thereto. Missoula is the seat of the State University of Montana, which was opened in 1895. There are two hospitals in the city, one of them maintained by the Northern Pacific railway and its employees, in which the employees of the company are treated; the other one is owned and maintained by the Sisters of Charity of the Catholic Church and called Saint Patrick's Hospital. The same Sisters of Charity have a very large academy called the Sacred Heart. A commercial college is also located here, and the city has a splendid system of public schools. The new public library building is well supplied with books. There are many wholesale and retail stores, and a large mercantile business is done in supplying the local trade, and also in supplying the various mining and lumbering re-

gions tributary to the city. There are two large manufacturing establishments engaged in the manufacture of doors, sash, blinds, dressed lumber, and other building materials; also one brewery, one flouring mill, bottling works, and other manufacturing establishments. The city supports two national and one private bank; it also has 10 churches of different denominations, and a large number of lodges of fraternal organizations, and sustains a Business Men's Club. Fort Missoula, a United States military post, 4 miles west of the city, is garrisoned by four companies of infantry troops. The city is the trade centre for a large section of country, and ships large quantities of grain, fruit, hay, live-stock, wool and lumber. The Flathead Indian Reservation, which by an act of congress was directed to be surveyed and opened for settlement, lies about 15 miles north of the city, and contains approximately 1,750,000 acres of fine agricultural, grazing and timber lands. This body of land is now being surveyed by the United States government, preparatory to being thrown open to settlement, all of which will be tributary to the city. Pop. about 8,500.

MISSOURI, *mĭs-sō'rĭ:* a state; one of the United States of America; 11th in order of admission into the Union; 5th in population in 1880, 5th in 1890, and 5th in 1900; 10th in railroad mileage; 7th in value of manufactures in both 1890 and 1900; in 1902, 3d in production of corn, 2d in hay, 2d in number of mules. Popularly known as the 'Pennsylvania of the west'; named from the Missouri river.

Location and Area.—Missouri is in lat. 36°—40° 30′ n., long. 89° 2′—95° 42′ w.; bounded n. by Iowa, e. by Illinois, Kentucky, and Tennessee, s. by Arkansas, w. by Oklahoma, Kansas, and Nebraska; extreme length n. and s. 277 m., extreme breadth 312 m., mean breadth 208-244 m.; 69,415 sq.m. (44,425,600 acres); Mississippi river frontage about 500 m.; cap. Jefferson City.

Topography.—In general, the n. portion is level, and the s. undulating and rising gradually to the Ozark mountains. Along the Mississippi river, from Cape Girardeau to the mouth of the St. François river, lies the Great Swamp, with more than 100 m. in Missouri, the most extensive of the numerous swamps in this region, and a marked feature of the Missouri bottom-lands. The bottom also contains many small islands, lakes, and lagoons, some of the former being above inundation-mark. Where there is any considerable amount of soil in this region, it is very fertile. In the basin of the Osage river the surface becomes rolling prairie, and above it bears noticeable forest growths; while the valley of the Missouri river has a rich alluvial soil, and abounds in forest trees of large size. Broad valleys stretch between the Mississippi and Missouri rivers; woodlands occur chiefly on the margins of water-courses; and the treeless, upland prairies comprise about nine-tenths of the entire state.


MISSOURI
SCALE OF MILES
0 10 20 40 60 80
SOUTHERN EXTENSION OF MISSOURI
On same scale as large map
JEFFERSON CITY
Kansas City
St. Louis
St. Joseph
Springfield
Hannibal
Sedalia
Carthage
Joplin
Webb City
Atchison
TOPEKA
Quincy
Decatur
Mattoon
Effingham
Centralia
Mt. Vernon
Nashville
Jonesboro
Cairo
Paducah
KENTUCKY
Ohio R.
Mississippi R.
Missouri R.
Area in Square Miles, 69,415.
Population, 3,106,665.
Number of Counties, 115.
Capital of State, Jefferson City.

The drainage of Missouri is chiefly by the Mississippi river, which forms its entire e. boundary, and is navigable the year round, excepting when obstructed by ice; the Missouri, which nearly bisects the state, flowing from the n.w. corner to the Mississippi, to a point just below Alton, Ill., and navigable like the Mississippi; the Osage, which flows into the Missouri on the s., and is navigable for small steam-boats half the year; and the St. François, White, Black, Gasconade, Grand, Chariton (all navigable for small boats in the open season), Salt, South Grand, Platte, Nodaway, Sac, Meramee, Cuivre, Castor, and Niangua (non-navigable streams). The Missouri river forms the w. boundary of Missouri for nearly 200 m., and is a rapid, turbid stream, more than half a m. wide at its mouth, and through the greater part of its course wider still; and though draining an enormous stretch of country and receiving many large tributaries, it is exceedingly shallow at certain seasons. The Des Moines river forms a part of the n.e. boundary of the state.

Climate.—Missouri is subject to great extremes of heat and cold, the thermometer ranging from 100° above zero to 8° below; but these extremes are infrequent and of short duration, and the climate is healthful, with a generally dry, pure, salubrious air. The summers and winters of Missouri closely resemble those of Mississippi. The temperature at St. Louis ranges in winter from 30° to 43°, and in summer from 75° to 80°, with average rainfall 42 inches; annual mean temperature at Jefferson Barracks 55.46°, rainfall 37.83 inches. The river-bottoms and swamps in the s.e. are malarious, and the Missouri river for several weeks in winter is generally frozen so hard as to be safely crossed by loaded wagons.

Geology.—The main formations are quaternary, with alluvium, bluff, and drift; carboniferous or coal measures; Devonian rocks, Hamilton and Onondaga groups; upper Silurian, in four groups, and lower, in three; magnesian limestone, three groups; and eozoic or archaic rocks. The mineral riches of Missouri are greater than those of any other state. Some gold is found in the drift-sands of the n. portion, and some silver in combination with lead in the galena ores. The coal measures predominate, and are followed by iron (bog in the s.e.; brown hematite in the s.; red hematite in the coal measures; spathic ores in the coal measures and in Phelps county; specular oxide in the Iron Mountain, Shepherd Mountain, Simmon Mountain, and the Pilot Knob districts; sulphurets in the coal measures; and sulphates there and in abandoned coal mines); lead, chiefly in the s.e. and the s.w. portions; nickel and cobalt, in Madison county and the St. Joseph mines; and millerite, near St. Louis. Besides these, large quantities of wolfram, carbonate of lime, pearl-spar, fluor-spar, felspar, sulphate of baryta, gypsum, mica, asbestos (in Madison county), mineral

tar, potter's clay, fire-clay, kaolin, sand-glass, hydraulic lime and cement, saltpetre, grindstones, white and colored marbles, slates, millstones, granite, and a variety of building stones, are found. The principal mineral springs are sulphurous, saline, and chalybeate.

Zoology.—The mountains abound in wolves, raccoons, opossums, and foxes, and other wild animals; game animals are deer, rabbits, squirrels, hares, wild turkeys, quails, pigeons, prairie hens; eagles, vultures, owls, and hawks are frequently seen; wild geese, ducks, brant, teal, herons, and swans are plentiful in season in the principal rivers and swamps; and snakes, lizards, toads, frogs, and turtles frequent the bottoms and swamp-lands. There is also a large variety of song and plumage birds.

Farming and Stock Raising.—The staple products of Missouri are wheat, oats, Indian corn and tobacco, but in the southern portions of the state cotton, hemp and flax are also raised to some extent. Thirty bushels of wheat to the acre is an average yield, which is often far exceeded. The flour from Missouri wheat is in great demand in the foreign as well as the home markets, and is regarded as of very high quality. All kinds of grass which favor the raising of stock grow luxuriantly, such as blue grass, timothy, red top, red and white clover. The raising of pork is a large industry, on account of the cheapness of corn. All kinds of fruit are successfully cultivated, not only the more hardy fruits such as the apple, pear, plum, and cherry, but those which require a softer climate, such as apricots, nectarines, figs, and many varieties of grapes. Apples and peaches grow well in all parts of the state. Very many varieties of grapes are found, especially in the southern part of the state, from which large quantities of wine are made. In the production of both red and white wines Missouri may be said to compete successfully with any of the vine-growing states of the Union. In the southern counties of Missouri sheep raising has been carried on with profit, the mild climate, the quality of the grass, and the abundance of good water being especially favorable here to this branch of agricultural industry. There are in Missouri in round numbers 23,000,000 acres of improved, and 10,000,000 acres of unimproved land, including 9,000,000 acres of woodland. The value of the farms, including land and improvements (except buildings), is estimated at $695,470,000; the value of buildings, $148,508,400; of implements and machinery, $28,602,680; and of live stock, $160,540,000. In 1907, there were on the farms throughout the state 948,420 horses; 315,250 mules, asses, and burros; 957,100 cows and 2,397,000 other cattle; 997,500 sheep; 3,454,950 swine. Missouri ranks fourth among the corn-producing states of the Union. In the culture of tobacco it may be put alongside of Kentucky, Virginia, Tennessee, and Maryland. Tobacco is a staple article in the northern central part of the state, in the rich counties

bordering upon the Missouri river. In 1906, the principal crops were: corn, 228,522,500 bushels, valued at $86,838,-550; wheat, 31,734,900 bushels, valued at $21,262,383; oats, 14,685,503 bushels, valued at $4,846,216; barley, 39,882 bushels, valued at $19,143; rye, 284,400 bushels, valued at $170,640; buckwheat, 27,018 bushels, valued at $19,993; potatoes, 7,159,152 bushels, valued at $4,080,-717; hay, 2,128,112 tons, valued at $21,281,120; tobacco, 1,093,540 pounds, valued at $98,419; and 262,026 bushels of flaxseed, valued at $243,684. The wool production in 1906 was valued at $1,341,560. Fruit was raised as follows: apples, 8,698,170 bushels; peaches, 61,006 bushels; grapes, 13,783,656 pounds; cherries, 62,708 bushels.

Manufactures.—In 1905, there were 6,464 manufacturing establishments, capitalized at $379,368,827; the number of wage-earners was 133,167, whose wages amounted to $66,644,126; the cost of materials used was $252,258,-417; and the value of the products was $439,548,957. The leading industries are slaughtering and meat-packing, $60,031,133; flour and grist mill products, $38,026,142; tobacco products, $27,836,422; malt liquors, $24,154,264; boots and shoes, $23,493,552; foundry and machine shop products, $16,849,974; lumber and timber products, $10,-903,783; and men's clothing, $8,872,831. Outside of the city of St. Louis the leading manufacturing counties are Jackson, Buchanan, Saint Charles, Marion, Franklin, Greene, Cape Girardeau, Platte, Boone, and Lafayette. St. Louis produces about three-fourths of the manufactured products of the state.

Commerce.—River transportation for freight has been revived in late years, and large quantities of cereal products especially are taken to New Orleans from St. Louis by river, and there transferred to the ocean-going steamships. Missouri has a large domestic commerce, shipping enormous quantities of cereals, pork, beef, live-stock, manufactures and merchandise, by rail and river, from St. Louis; and grain, live-stock, wool, hides and pelts, ores, pig-lead, bullion, and packed meat from Kansas City, the latter being the great cattle market of the s.w. since 1868. The imports of merchandise for 1906 at the custom houses at Kansas City, St. Louis, and St. Joseph aggregated in value $6,522,767.

Mining.—Missouri has large deposits of coal, iron, lead, zinc, and clays for the manufacture of the ordinary brick and for fire-brick. The Missouri coal mines are easily worked, and include upper, middle and lower measures. In the upper measures are about four feet of coal, which is found within an area of about 8,400 square miles. In the middle coal measures there are about 7 feet of coal within an area of about 2,000 square miles. The coal in the lower measures is found in several seams bearing from 1½ feet to 4½ feet in thickness. In 1906, 3,860,000 tons (of 2,000 pounds) of bituminous coal were mined in Missouri, the value at the mine being $6,176,-

000. Great deposits of iron ore have been found in Iron Mountain in the southeastern part of the state, in Shepard Mountain and at Pilot Knob. The Scotia Iron Banks and Iron Ridge also furnish ores which in appearance and character are generally found in boulders imbedded in soft red hematite. While the chief deposits of iron ores are found in the above-mentioned places, smaller deposits are found throughout the hilly regions of the southern part of the state, especially in the counties of Saint Genevieve, Madison, Saint François, Cape Girardeau, Bollinger, Wayne, Stoddard, Washington, Reynolds, Shannon, Carter, and Ripley. The supply of iron ores may be said to be practically inexhaustible. Lead is found in vast deposits in the southern part of the state. The great lead region through which lead ore is very generally disseminated occupies about one-half of the northern portion of Madison county, and a somewhat larger territory in Saint François county. The lead is found in the magnesian limestone, and although the percentage of lead in the ore is small, when worked upon a large scale a good profit ensues. The great lead mines of Granby were in the early history of the lead industry in Missouri the best known in the state. Millions of pounds of lead have from time to time been taken from these lands. Of late years the neighborhood of Bonne Terre, in which are located the works of the Saint Joseph Lead Company, has been occupied by several corporations under whose direction vast quantities of lead are obtained every year. It is doubtful whether any other section in the country, or perhaps in the world, produces so much lead each year as is produced in these works. The total lead production of Missouri amounts to nominally 300,000 tons.

Zinc is found in the shape of sulphide, and also silicate of zinc, in nearly all the lead mines of southwestern Missouri. A quarter of a century ago it was found in such masses as to hinder mining operations, and on account of the lack of railroad facilities it was thrown aside as worthless until vast quantities of it had accumulated. Of late years, however, zinc has been an important and profitable adjunct of the lead mines of Missouri. Small quantities of cobalt and some nickel are found in the lead mines of the southeast. Building stone of all kinds, including marble, limestone, sandstone, and both red and gray granite, abound in Missouri, and constitute an important item in the mineral values of the state. Among the marble deposits is a notable cave, the entrance to which is on the summit of Roark Mountain, in Stone county, 18 m. s.e. of Galena and 3 m. n. of White river. It contains a beautiful chamber 150 ft. high; a stalagmite 300 ft. in diameter at the base, 130 ft. high; and within the stalagmite, 60 ft. from its base, a chamber 30x40 ft., and a pool of clear, cool water 15 ft. in diameter. The top of the main chamber is dome-shaped, and about two-thirds the way up is an attractive tracery of fringe

extending entirely around it. The cave has numerous striking features, to which fanciful names have been given.

Railroads.—The first railroad was opened 1852, with 38 m. of track. The development since has been: (1855) 139 m.; (1860) 817; (1865) 925; (1870) 2,000; (1875) 2,905; (1880) 4,007; (1884) 5,360; (1890) 6,142; (1893) 6,464; (1894) 6,517; (1895) 6,567; (1896) 6,575; (1904) 7,797.-18; (1905) 7,859.57. Many important systems of railroads traverse the state, connecting at different points with the great trunk lines leading to all parts of the country. About 30 railroads have their entrance into the great Union Station at St. Louis. Besides these main lines many cross lines and electric roads have been constructed and are in process of construction throughout the state. The leading trunk lines with eastern branches are the Wabash, the Pennsylvania, the Baltimore & Ohio Southwestern, and several lines running directly to Chicago, namely, the Illinois Central, the Chicago & Alton, Wabash, Rock Island, Chicago, Burlington & Quincy. The lines running to the west, northwest, and southwest are the Missouri Pacific, which connects at various points with the great southwestern lines; the Wabash; the Chicago, Burlington & Quincy; the Rock Island; the Iron Mountain, which is included in the Missouri Pacific system; the San Francisco, included in the Rock Island system. These are the leading railroads, which connect at many points with all the great thoroughfares of the United States.

Churches.—The first settlers of Missouri were Roman Catholics. In 1819, Christ Church (Protestant Episcopal) was founded in St. Louis, and soon various religious bodies established themselves in all parts of the state. In the cities and towns along the great rivers the Roman Catholic Church is today very strong, and its members are numerous throughout the state. The Methodists (both Northern and Southern wings), the Baptists, the Presbyterian (several branches), and the Episcopalian are the leading Protestant bodies as to numbers, in the order named. Each of these organizations, except the Episcopalian, has a college supported mainly by its members, and the Roman Catholics have, chiefly in the cities, their parochial schools.

Education.—In 1905, the estimated school population was 978,191, the number of pupils enrolled was 728,800, and the average daily attendance 470,666. There were 17,385 teachers; the salaries of superintendents and teachers aggregated $5,964,024, and the total expenditures were $10,101,923. Missouri has a public school system of education, adopted in 1839. There are district schools, elementary and ungraded; city schools, graded, with high-school courses. There are four normal schools maintained by the state, and a State University. The State University is supported by what is called 'The Per-

manent Endowment,' consisting of certificates of indebtedness amounting to a total of $1,235,839, and the total appropriations made by the legislature of the state for the entire university, including all departments, is annually about $600,000. The total amount of funds for the use of public schools is $12,795,516. From the income of this amount there was paid in 1905 for teachers' wages the sum of $5,964,024 in the city, town and village schools. Free public schools for white and colored children between the ages of 6 and 20 years are required by law for every district in the state. In 1906, there were 337 public high schools, 59 private secondary schools, 19 coeducational colleges and colleges and universities for men only, 9 colleges and seminaries for women, 6 theological schools, 5 law schools and 13 medical schools. The value of buildings and grounds of private educational institutions is about $7,000,000, and the amount of permanent endowment was over $9,000,000.

The institutions for the superior instruction of women included: Christian Female College (Christian), Columbia; Stephens Female College (non-sect.), Columbia; Howard Female College (Meth. Episc.), Fayette; Fulton Synodical Female College (Presb.), Fulton; Kansas City Ladies' College (Presb.), Independence; Woodland College (Christian), Independence; St. Louis Seminary (non-sect.), Jennings; Bapt. Female College, Lexington; Central Female College (non-sect.), Lexington; The Elizabeth Aull Female Seminary (Presb.), Lexington; Hardin College (Bapt.), Mexico; Lindenwood Female College (Presb.), St. Charles; Mary Institute, Washington Univ. (non-sect.), St. Louis; and Ursuline Acad. (Rom. Cath.), St. Louis.

The colleges of liberal arts were: Southwest Bapt. College, Bolivar, chartered 1879 (Bapt.); Pike County College, Bowling Green, 1887 (non-sect.); Christian Univ., Canton, 1852 (Christian); St. Vincent's College, Cape Girardeau, 1843 (Rom. Cath.); Univ. of the State of Missouri; Grand River College, Edinburg, 1876 (Bapt.); Central College, Fayette, 1855 (Meth. Episc., South); Westminster College, Fulton, 1853 (Presb.); Lewis College, Glasgow, 1867 (Meth. Episc.); Pritchett School Institute, Glasgow, 1868 (non-sect.); La Grange College, La Grange, 1859 (Bapt.); William Jewell College, Liberty, 1849 (Bapt.); Morrisville College, Morrisville, 1872 (Meth. Episc., South); College of the Christian Brothers, St. Louis, 1855 (Rom. Cath.); St. Louis University, St. Louis, 1832 (Rom. Cath.); Washington University, St. Louis, 1853 (non-sect.); Drury College, Springfield, 1873 (Congl.); Tarkio College, Tarkio, 1885 (Unit. Presb.); Central Wesleyan College, Warrenton, 1864 (Meth. Episc.); Central Christian College, Albany, 1892 (Christian); Northwest Missouri College, 1891 (Meth. Episc., South); Lawson Presbyterian College,

Lawson, 1891 (Presb.); Scarritt Collegiate Institute, Neosho, 1889 (Meth. Episc., South).

Charitable and Penal Institutions.—The state penitentiary is located at Jefferson City. The number of prisoners is about 2,000. At Booneville is a reform school for boys. This school is maintained by the counties from which the boys are sent and costs about $23,000 a year. At Chillicothe is the Girls' Industrial School, upon which is expended annually $14,000. A refuge for the feeble-minded has been established at Marshall, and at Fulton, St. Joseph, Nevada and Farmington are state asylums for the insane. The state also aids to some extent the insane asylum at St. Louis. At Higginsville is the Confederate Home, and at St. James the Federal Soldiers' Home.

Finances.—In 1907, the assessed valuation of the state was $1,552,683,431. The bonded debt of the state was cancelled in 1903. The state indebtedness amounted in 1904 to $4,398,839.42. In 1907, the assessed valuation of all the taxable property in the city of St. Louis was $509,975,840 The net public debt was $18,828,178. In Kansas City in 1907 the assessed valuation of all taxable property was $131,140,260. The net public debt $4,273,708.

Banks.—In 1908, there were 119 national banks in operation, with resources of $336,106,255.22; capital stock, $30,455,000; surplus of $16,382,774.95; and deposits of $119,608,689.93. There were 890 state banks, with resources of $217,835,638; capital of $25,061,110; surplus of $11,390,448; and deposits of $160,709,378. There were 33 loan and trust companies, with aggregate resources of $142,738,227; capital of $21,075,000; surplus of $21,128,927; and deposits of $76,104,494. The 69 private banks had resources of $8,263,462; capital of $913,000; surplus of $644,579; and deposits of $6,173,405.

History.—The early history of Missouri is identical with that of Louisiana (q.v.), of which territory it formed a part till 1812, when Louisiana, being admitted as a state, the remainder of the tract was erected into the territory of Missouri. Prior to this event, portions of the present state had become important and well known. Some of its lead mines were worked as early as 1720; and between that date and 1760, St. Louis, Cape Girardeau, and St. Genevieve were settled, the first as a fur-trading station. In 1775, St. Louis had population of about 800, and 1780 was attacked by a body of English soldiers and Indian allies from Michilimackinac, and was saved only by the timely arrival of Gen. Clarke, who hastened from Illinois at the call for aid. In 1817, the first steps were taken to secure admission into the Union. The petition of the territorial legislature to congress led to a bitter struggle. The question at issue was whether Missouri should be admitted as a slave or a free state. A bill was introduced into congress in 1818-19 providing that the territory should be admitted as a free state. This bill was

strenuously opposed by the southern members, who were anxious that slavery should be legalized in the new state. The first constitution prepared forbade the legislature to pass emancipation laws without consent of owners, or to prevent immigrants from bringing slaves into the state with them, and directed it to prevent free negroes and mulattoes from coming to and settling in the state under any pretext. Chiefly through the influence of Henry Clay (q.v.), a compromise was effected, by which M. was to be admitted as a slave state, on condition that from all the terr. w. of M., and n. of the parallel of 36° 30′ (the s. boundary of the new state), slavery should be excluded forever. This compromise allayed the excitement somewhat, but the 'free negro' clause in the proposed constitution revived it. The bill for admission passed the senate, but in the house a proviso was added that the state should abolish slavery, to which the senate disagreed. 1821, Mar. 2, another compromise was adopted, by which M. was to be admitted on the condition that the legislature should pledge the faith of the state that the 'free negro' clause should never be executed. June 26 following, the legislature passed a public and 'irrevocable' act in the terms required, though it declared in a preamble that the act was merely one of policy, to secure speedy admission, that the requirement of congress was unconstitutional, and that the people of the state did not intend to respect the condition so imposed. The compromise agreement was observed till virtually repealed by the bills which established the territories of Kan. and Neb. 1854; and M. was admitted by presidential proclamation 1821, Aug. 10. Excepting the part taken by some of its citizens in the Kansas (q.v.) troubles 1854-59, the history of the state was that of general prosperity till the beginning of the civil war. 1861, Jan. 16, the state senate adopted a bill providing for a convention to determine the position of the state on the question of secession. This body met in Jefferson City Feb. 28, and in St. Louis Mar. 4. The dominant feeling in the state, the legislature, and the convention, was in favor of the Union; and nothing occurred to indicate opposition to the prosecution of the war till June 12, when, in consequence of a difficulty between the federal troops sent to St. Louis, as an important military point, and the state militia, Gov. Jackson called out 50,000 state militia to 'repel invasion,' and removed with other state officers from Jefferson City to Boonville. Two days later, the federal troops, under Gen. Nathaniel Lyon (q.v.), attacked the state militia at Jefferson City and defeated them. On July 30 the convention declared the legislature dissolved, and chose a new gov. (Gamble), lieut.-gov., and sec. of state. Gov. Jackson immediately issued another proclamation, in which he declared M. to be out of the Union. More federal and some Confederate troops were at once thrown into M.; Gen. Lyon was killed in the battle of Wilson's Creek, near Spring-

field, Aug. 10; Gen. Fremont declared martial law Aug. 21; and a large Confederate force under Gen. Sterling Price, captured Lexington Sep. 20. Fremont advanced into the s.w., having several skirmishes on the way, and was succeeded by Gen. Hunter Nov. 2, and he by Gen. Halleck, as commander of the w. dept., Nov. 18. About this time nearly half the state was held by the Confederates, and an attempt was made, by some members of the old legislature, to force the state into the Confederacy. In 1862, Feb., the Confederates under Gen. Price were driven into Ark. by federal troops under Gen. Curtis; and during 1862 and 1863 the state was disturbed by guerilla warfare, mainly on the s. border. The convention of 1861, kept alive by adjournments, passed an ordinance 1863 providing for the emancipation of all slaves in the state in 1870. Late in 1864, Gen. Price again invaded M. and made a raid diagonally from s.e. to n.w., but was ultimately forced to retreat into w. Ark. In 1864, Nov., a state election was held, the state having been governed since 1861, July, by officers elected by the convention. 1865, Jan. 6, a convention assembled in St. Louis and framed a new constitution, which was adopted by the people June following; 1869 the last of the amendments (15th) to the federal constitution was ratified by the legislature; and 1875, Oct. 30, the present state constitution was adopted.

Government.—The executive authority is vested by the constitution (1875) in a gov. elected for 4 years; the legislative in a general assembly, comprising a senate of 34 members elected for 4 years, and a house of representatives of 140 members elected for two years, salary of each $5 per day and mileage, sessions biennial, limit of sessions 70 days; and the judicial in a supreme court, the St. Louis court of appeals, the Kansas City court of appeals, the state circuit courts, criminal courts, probate courts, and municipal courts. The judges and officers of the courts are elected by the people. Judges of the supreme court are elected for 10 years; of the St. Louis and Kansas City courts of appeals for 12 years; of the circuit courts for 6 years. The successive govs., with their terms of service are as follows: Alexander McNair, 1820-24; Frederick Bates, 1824-26; John Miller, 1826-32; Daniel Dunklin, 1832-36; Lilburn N. Boggs, 1836-40; Thomas Reynolds, 1840-44; John C. Edwards, 1844-48; Austin A. King, 1848-53; Sterling Price, 1853-57; Trusten Polk, 1857; H. Johnson (act'g), 1857; R. M. Stewart, 1857-61; Claiborne F. Jackson, 1861; Hamilton R. Gamble, 1861-64; Thomas C. Fletcher, 1865-69; Joseph W. McClurg, 1869-71; Benjamin Gratz Brown, 1871-73; Silas Woodson, 1873-75; Charles H. Hardin, 1875-77; John S. Phelps, 1877-81; Thomas T. Crittenden, 1881-85; John S. Marmaduke, 1885-87; Allen G. Morehouse, 1887-89; David R. Francis, 1889-93; William J. Stone, 1893-97; L. V. Stephens, 1897-1901; Alexander M. Dockery, 1901-5; J. W. Folk, 1905-9; H. S. Hadley, 1909-

Politics.—State, congressional, and presidential elections are held Tuesday after first Monday in Nov. Officers and men in the U. S. army, and inmates of asylums, poor-houses, and prisons, are excluded from voting. M. has 18 electoral votes. Her votes for pres. and vice.-pres. have been as follows: 1824, Henry Clay and Andrew Jackson, 3; 1828, Andrew Jackson and John C. Calhoun; 1832, Andrew Jackson and Martin Van Buren, 4; 1836, Martin Van Buren and Richard M. Johnson; 1840, Martin Van Buren and Richard M. Johnson; 1844, James K. Polk and George M. Dallas, 7; 1848, Lewis Cass and William O. Butler; 1852, Franklin Pierce and William R. King, 9; 1856, James Buchanan and John C. Breckinridge; 1860, Stephen A. Douglas and Herschel V. Johnson; 1864, Abraham Lincoln and Andrew Johnson, 11; 1868, U. S. Grant and Schuyler Colfax; 1872, Thomas A. Hendricks 6, B. Gratz Brown 8, and David Davis 1, for pres., and B. Gratz Brown 6, George W. Julian 5, J. M. Palmer 3, and William S. Groesbeck 1, for vice-pres.; 1876, Samuel J. Tilden and Thomas A. Hendricks, 15; 1880, Winfield S. Hancock and William H. English; 1884, Grover Cleveland and Thomas A. Hendricks, 16; 1888, Grover Cleveland and Allan G. Thurman, 16; 1892, Grover Cleveland and Adlai E. Stevenson, 17; 1896, William J. Bryan and Arthur Sewall, 17; 1900, William J. Bryan and Adlai E. Stevenson, 17; 1904, Theodore Roosevelt and Charles W. Fairbanks, 18; 1908, W. H. Taft and J. S. Sherman, 18.

MISSOU'RI RIVER: the great head stream which forms by union with the upper Mississippi river and the Ohio river. The name signifies Mud river, and the character of the water known for more than 1,200 m. of the Mississippi, from the Gulf of Mexico, is given by the M. Below the confluence of the two streams, 16 m. above St. Louis, the separate volumes of the upper Mississippi and the M. flow side by side for a long distance without mingling, and it is plain to the eye which is the great river and which will be lost in the other. The lower reach of the M. is of about 400 m. across the state of Mo., in a generally e. direction. From Kansas City n. it is the w. boundary of the state, and beyond the n.w. corner of Mo. the ascent of the stream is generally e. and w., past the mouth of the mouth, and thence n.w. and n. across S. Dak. and more than half of N. Dak. From this point the line of the stream is generally e. and w., past the mouth of the Yellowstone, a great navigable tributary, and far on to the foot-hills of the Rocky Mts., where the Great Falls occur, a succession of four within 16½ m.; the successive perpendicular rises being 87 ft., 19 ft., 47 ft., and 26 ft. The rapids connecting the cataracts increase the whole rise to 357 ft. The ascending course of the stream penetrates the Rocky Mts. 145 m. further on, by a narrow gorge, 5¾ m. long, 450 ft. wide, and with walls of rock rising perpendicularly 1,200 ft. directly from the water. The source is 400 m. beyond these 'Gates of

the Rocky Mts.,' in the confluence of two small streams, the Jefferson and Wisdom, of which the latter rises within a mile of the head springs of Clarke's fork of the Columbia. The stream thus formed is joined 80 m. down by the Gallatin and Madison, and this confluence of three rivers is by some regarded as the starting-point of the M. The higher point is at the boundary between Mont. and Ida., lat. 45° 15′ n., and long. 110° 30′ w.; and for nearly 2,000 m., descending the river, the course is through Mont., N. Dak., and S. Dak., after which it has Io. and the n. part of Mo. on its left bank, and Neb. and Kan. on its right, until, at Kansas City, it passes into and across Mo., to its mouth, 2,908 m. from the lower source, or 2,988 from the highest, and 1,286 m. from the fall of its muddy waters into the Gulf of Mexico. The width of the M. is 1,500 ft. at Fort Benton, 2,500 ft. at Sioux City, and 3,000 ft. from St. Joseph to its mouth. The highest source is not far from 7,000 ft. above sea-level; that at Fort Benton 2,845 ft.; at Sioux City 1,065 ft.; at St. Joseph 756 ft.; and at its mouth 381 ft. The mouth of the M. is 159 m. above the passage of the trunk river into the head of the Mississippi alluvial basin, and 189 m. above the mouth of the Ohio. Navigation on the M. is regular to the mouth of the Yellowstone, on the border of N. Dak. and Mont., and it may extend as far as the Great Falls. The Yellowstone, a navigable river for about 300 m., is the largest tributary of the M., and lower down other tributaries on the right are the Little Missouri, Big Cheyenne, White Earth, Niobrara, Platte or Nebraska, Kansas and Osage. On the left it receives the Milk, Dakota, Big Sioux and Little Sioux. All the great streams which rise on the e. side of the Rocky Mts., except the Arkansas, thus send their waters into the M., which, with its large share of the streams between it and the upper Mississippi, drains an area of 518,000 sq. m. The upper course of the M. is through a dry and open country, where at certain seasons the rapid evaporation of the water leaves portions of the stream shallow. The elevation of the sources is about 7,500 ft. above sea-level; and that of the stream at the mouth of the Yellowstone is 2,010 ft.; and the general flow of the water is rapid. On the lower course of the river its channel is cut through a rich alluvial valley, back of which, on either side lie extensive prairies. At its mouth the M. is over half a m. wide, and in many places higher up the width is much greater.

MISSOURI, UNIVERSITY OF, the state university located at Columbia, Boone county. It was chartered by the legislature in 1839, the cornerstone of the main building was laid in July, 1840, and instruction in academic work was begun in 1841. The organization comprises eight departments: (1) Graduate department, established 1896; (2) academic department; (3) department of education (1868); (4) law (1872); (5) medicine (1873); (6) military science and tactics (1890);

(7) college of agriculture and mechanic arts (1870); (8) school of mines and metallurgy (1870), situated at Rolla. The college of agriculture includes the school of agriculture, the school of engineering and the state experiment station. The school of engineering offers courses in civil, electrical, mechanical, sanitary, chemical and hydraulic engineering; the course in the school of mines includes mining and civil engineering. The degrees conferred are bachelor of arts, bachelor of laws, bachelor of science (in the college of agriculture and the mechanic arts, and the school of mines and metallurgy), and doctor of medicine; also the graduate degrees, master of arts, doctor of philosophy, master of science, master of laws, civil engineer, electrical engineer, mechanical engineer, sanitary engineer, and engineer of mines. In 1869 women were admitted to the normal department (department of education), in 1870 to the academic department, and soon afterward to all existing departments; they are now admitted on equal terms to all departments except the department of military science and tactics. A dormitory for women has been erected on the horticultural grounds which adjoin the regular campus. The University library includes the general library, 10 departmental libraries and the library of the school of mines. There being no special library building, the general library, the classical library, the political science library and the romance library are in Academic Hall; other departmental libraries are in the buildings of their respective departments, the library of the school of mines being at Rolla; these libraries contained in all about 75,000 volumes in 1906. There are rooms in Academic Hall set apart for gymnasium work for men and women, and there is also an athletic field; competitive athletics and inter-collegiate contests are encouraged, and though regarded as essentially a student enterprise, are under supervision of the faculty. In 1868 the state for the first time gave aid to the University, and has since made several appropriations for special purposes; the endowment is about $2,500,000; and the annual income is about $400,000. The students numbered 2,072 in 1905-6, and the faculty, 145.

MISSPEAK, v. *mĭs-spēk'* [*mis*, wrong, and *speak*]: in *OE.*, to blunder in speaking.

MISSPELL, or MISSPEL, v. *mĭs-spĕl'* [*mis*, wrong, and *spell*]: to write with wrong letters; to spell wrongly. MISSPELL'ING, imp.: N. a wrong spelling. MISSPELLED', pp. *-spĕld'*, or MISSPELT', pp. *-spĕlt'*: ADJ. wrongly spelt.

MISSPEND, v. *mĭs-spĕnd'* [*mis*, wrong, and *spend*]: to waste and consume to no purpose; to spend badly. MISSPEND'ING, imp. MISSPENT, pt. *-spĕnt*: ADJ. wasted; consumed to no purpose.

MISSTATE, v. *mĭs-stāt'* [*mis*, wrong, and *state*]: to state wrongly; to represent falsely. MISSTA'TING, imp. MISSTA'TED, pp. MISSTATE'MENT, n. *-mĕnt*, an erroneous representation, whether verbal or written.

MIST, n. *mĭst* [Icel. *mistr*, a foggy darkness in the air: Dut. *miest* and *mist*, mist; *mieselen*, to exhale a mist, to rain fine: Ger. *mist*, dung, mist]: the vapor of water hanging over sea or land, less dense than a fog (q.v.); vapor floating and falling in fine particles in the form of very small rain; that which dims or obscures, or intercepts vision, as if it were a vapor or a mist: V. in *OE.*, to cover with vapor; to cloud. MIST-LIKE, having the appearance of mist; misty. MISTY, *mĭst'ĭ*, a. overspread with mist; dim or obscure. MIST'FUL, a. *-fûl*, clouded with mist. MIST'ILY, ad. *-ĭ-lĭ*, darkly; obscurely. MIST'INESS, n. *-ĭ-nĕs*, state of being misty; obscurity.

MISTA'EN, pp. *mĭs-tān'*: a poetic spelling for MISTAKEN.

MISTAKE, v. *mĭs-tāk'* [*mis*, wrong, and *take:* Icel. *mistaka*, to take by mistake—from *taka*, to take]: to misunderstand; to conceive wrongly; to take one person or thing for another; to err in opinion or judgment: N. an error of any kind; a misconception; a blunder; an oversight. MISTA'KING, imp.: N. in *OE.*, an error. MISTA'KEN, pp. *-tā'kn*, wrong or in error, as applied to persons (this application to *persons* is a popular usage, but of doubtful propriety): misunderstood, as applied to things: ADJ. erroneous; wrongly judging; incorrect. MISTOOK, pt. *mĭs-tûk'*, did mistake. MISTAKABLE, a. *mĭs-tā'kă-bl*, that may be mistaken. MISTA'KENLY, ad. *-lĭ*. MISTA'KINGLY, ad. *-lĭ*. BY MISTAKE, under error or misapprehension; unintentionally. NO MISTAKE, *familiarly*, without fail; without possible error; with certainty. TO BE MISTAKEN, properly, to be taken wrongly, i.e., to be misunderstood; also popularly, but with doubtful propriety, to misunderstand, to commit an error of judgment; to be deceived.

MISTAKE', in Law: an error which may be due to ignorance, forgetfulness, carelessness, undue confidence in another, etc., which leads to the omission of something which should have been performed, or to the commission of an act which would not otherwise have been done. There are two classes of mistakes; those of law, and those of fact, which are very differently treated. The great principle that ignorance of the law is no excuse for wrong-doing is maintained in courts both of law and of equity. If this were abandoned many people would prefer to remain ignorant of matters concerning which they should be informed. If the M. is purely legal the law must take its course, even though the results of an act are radically different from those anticipated. But when there are such causes for the M. as incapacity, fraud, undue influence, or imposition, a court of equity may set aside the contract. When there is no fraud, either of act or of intent, but an error is held in common by both parties to a transaction, a compromise will usually be sustained by the court. The same is true of compromises of contested claims to estates. A M. in regard to the law of a foreign country is subject

to rectification on the ground that it is not obligatory on a resident of one country to study the laws of another. And a M. in law may be accepted as an excuse when a man has promised to perform a certain act because he supposed that it was obligatory on him to do so when no such claim existed. Mistakes of fact are much more readily corrected than are those of law. When an error shared by both parties is committed in ignorance of some important fact bearing on the case, relief can usually be secured through the courts, even though no fraud or deception has been attempted; but the facts must be of such importance as to exercise a determining influence on the transaction. The M. may be rectified by a return of the property to the former owner, or when that is impossible, by an imposition of money damages for any deficiency which may be found to exist. When the M. is on only one side, and there has been no fraud, legal relief cannot usually be secured. The means of information being open to both parties, each is supposed to look after his own interests. But where a party having apparent reason to do so, reposes confidence in another and is misled by the concealment of some important fact, he may be able to obtain redress from the courts of equity. Legal instruments, agreements, etc., which contain material errors and fail to set forth the intention of the parties may be corrected by order of the court, but this does not apply to a M. of law in which the language of the contract carries a different meaning from what the parties accepting it expected.

MISTASSINI, *mĭs-tăs-sē′nē*, LAKE: large lake in the s. part of N. E. Territory, Canada. The Territory extends from the n. side of the province of Quebec up the whole e. side of Hudson's Bay; and the lake is the head-water of Rupert's river, which flows w. into the s. arm of Hudson's Bay, James's Bay. The direction of the lake from Quebec is a little w. of n., and the situation is just beyond and close to, the Wotchish Mts., and directly opposite the head of an e. branch of the Saguenay river. Its dimensions are not accurately known; but it is probably about 100 m. long and 15 to 30 or 40 m. wide, but of irregular outline.

MISTAUGHT, v. *mĭs-tawt′* [*mis*, wrong, and *taught*]: pt. and pp. of *misteach;* wrongly taught.

MISTEACH, v. *mĭs-tēch′* [*mis*, wrong, and *teach*]: to instruct wrongly. MISTEACH′ING, imp. MISTAUGHT′, pt. and pp., which see.

MISTER, n. *mĭs′tėr* [a misspelling of *master*—from L. *magister*, a master]: a common title of address to any adult male, contracted into Mr.

MISTER: for MYSTER, trade; craft: see MYSTER.

MISTERM, v. *mĭs-tėrm′* [*mis*, wrong, and *term*]: to name erroneously.

MISTHINK, v. *mĭs-thĭngk′* [*mis*, wrong, and *think*]: in O*E.*, to think ill or wrongly. MISTHOUGHT′, n. *-thawt′*, a false opinion; a wrong thought.

MISTILY, MISTINESS: see under MIST.

MISTIME, v. *mĭs-tīm′* [*mis*, wrong, and *time*]: to arrange ill as to time; not to adapt to the time. MISTI′MING, imp.: N. the doing at a wrong time, or unseasonably. MISTIMED′, pp. *-tīmd′*: ADJ. done out of season or at a wrong time.

MISTITLE, v. *mĭs-tī′tl* [*mis*, wrong, and *title*]: to designate by a wrong title or name. MISTI′TLING, imp. *-tī′-tlĭng*. MISTI′TLED, pp. *-tī′tld*.

MISTLETOE, or MISLETOE, or MISSELTOE, n. *mĭz′l-tō* [Icel. *mistelteinn;* AS. *misteltan;* Dut. and Ger. *mistel*, the mistletoe—the latter part is the Icel. *teinn*, a prong of metal: Norw. *tein;* Goth. *tains*, the shoot of a tree, a twig]: genus (*Viscum*) of small parasitical evergreen shrubs of nat. order *Loranthaceæ*. This order is exogenous, and contains more than 400 known species, mostly tropical and parasites. The leaves are entire, almost nerveless, thick and fleshy, and without stipules. The flowers of many species are showy. The calyx arises

Mistletoe (*Viscum album*).

from a tube or rim, which sometimes assumes the appearance of a calyx, and is so regarded by many botanists; what others deem the colored calyx being viewed by them as a corolla of 4 or 8 petals or segments. Within this are the stamens, as numerous as its divisions, and opposite to them. The ovary is one-celled, with a solitary ovule; the fruit one-seeded, generally succulent.—COMMON M.

(*V. album*) is a native of Britain and of the greater part of Europe, forming a bush about 4 ft. long, growing on many kinds of trees, particularly on the apple, and others botanically allied to it, as the pear, service, and hawthorn; sometimes, also, on sycamores, limes, poplars, locust-trees, and firs, but very rarely on oaks (contrary to the common belief). It is very plentiful in some parts of s. England, its evergreen leaves giving a peculiar appearance to the orchards in winter, when the bushes of M. are very conspicuous among the naked branches of the trees; but it is very local. The stems are *dichotomous* (i.e., divide by forking); the leaves are opposite, of yellowish-green color, obovate-lanceolate, obtuse. The flowers are inconspicuous, and grow in small heads at the ends and in the divisions of the branches, the male and female flowers on separate plants. The berries are about the size of currants, white, translucent, and full of a very viscid juice, which serves to attach the seeds to branches, where they take root when they germinate, the radicle always turning toward the branch, whether on its upper or under side. The M. derives its nourishment from the living tissue of the tree on which it grows, and from which it seems to spring as if it were one of its own branches. The berries are a favorite food of thrushes; and it has been supposed that the M. was propagated by the seeds deposited from the birds; the propagation is really by the wiping off of the seeds from the bird's beak which it rubs against the bark. Bird-lime is made from the seeds and bark. The M. was intimately connected with many superstitions of the ancient Germans and of the British Druids. In the northern mythology, Balder is said to have been slain with a spear of mistletoe. Among the Celts, the M. which grew on the oak was in peculiar esteem for magical virtues. Traces of the ancient regard for the M. remain in some old English and German customs, as kissing under the M. at Christmas. The M. was at one time in high repute as a remedy for epilepsy and convulsions, but it seems to possess no decided medicinal properties.—*Loranthus Europæus*, a shrub very similar to the M., but with flowers in racemes, is plentiful in parts of s. Europe, and very frequently grows on oaks.—*L. odoratus*, Nepaulese species, has very fragrant flowers. —*American Mistletoe* (*Phoradendron flavescens*) differs little from the European, and was formerly included in the same genus. It has a globular calyx, 3 (rarely 2–4) lobed; and is found on deciduous trees from N. J. to Ill. and southward. *Note.*—*Mistel*, the 'mistletoe,' is a dim. of Ger. *mist*, dung—probably in reference to the seeds deposited by the birds who eat the berries, or it may refer to the slime of the berries: O. Dut. *mistel*, bird-lime—see Skeat.

MISTOOK: pt. of MISTAKE, which see.

MISTRAL, n. *mĭs'trăl,* or MISTRAON, or MAESTRAL [F. *mistral;* OF. *maestral,* the mistral—from It. *maestrale*—from mid. L. *magistrālis—lit.,* the masterful wind]: Provençal designation of the *Caurus* or *Corus* of the Romans; a n.w. wind which at certain seasons of the year prevails on the s. coast of France. Its approach is heralded by a sudden change of the temperature, from genial warmth to piercing cold; the air is felt to be purer, and more easily inhaled, the azure of the sky is undimmed by cloud, and the stars shine by night with extraordinary and sparkling brightness; this last appearance is an infallible prognostic. The mistral then comes in sudden gusts, struggling with the local aërial currents, but its fast increasing violence soon overcomes all opposition. In a few hours, it has dried up the soil, dispersed the vapors of the atmosphere, and raised a dangerous tumult among the waters of the Mediterranean. The mistral blows with its greatest force from the end of autumn to the beginning of spring, and causes much damage to the fruit-trees in blossom, and often to the field-crops. It is a terror to the mariners of the gulfs of Lyon and Valence, and even the most hardy seaman makes all haste to a harbor of refuge. The most probable cause of the mistral is the derangement of atmospheric equilibrium produced by the cold condensed air of the Alps and Cévennes rushing in to supply the vacuum produced by the expansion of the air in the warm s. provinces of France, and on the surface of the Mediterranean. This wind is appropriately denominated by the Italians *Maestro.*

MISTRAL, *mēs-trâl,* FRÉDÉRIC (or FREDERI): French poet: b. Maillane, Bouches-du-Rhone, 1830, Sep. 8. He studied law for a time at Aix, but soon abandoned it, and gave his attention to writing in Provençal, the dialect of southern France, which, under the influence of Jasmin, the 'barber-poet,' had entered on a renaissance as a literary medium. In 1854, he, with six others, founded the well-known Society of the Felibrige; and in 1859 he published his *Mirèio,* a narrative poem in the recovered language, which was crowned by the Académie in 1861. A second work in verse, *Calendau,* came out in 1867; a volume of poems, *Lis Isclo d'Or* (The Isles of Gold), in 1875; *Lou Trésor dou Félibrige,* a dictionary of modern Provençal, in 1878-86; and the historical poem *Nerto* in 1884. *La Rèino Jano* (1890) is a tragedy, and *Le Poème du Rhône* (1879) another narrative poem. There are English renderings of *Mirèio* by Grant (1867), Crichton (1868), and Preston (1872). Consult: Gaston, Paris, *Penseurs et Poètes* (1896); Welter, *Frédéric Mistral, der Dichter der Provence* (1899); Downer, *Frédéric Mistral* (1901). In 1904 he received the Nobel prize in literature.

MISTRANSLATE, v. *mĭs'trăns-lāt'* [*mis,* wrong, and *translate*]: to translate erroneously. MIS'TRANSLA'TING,

imp. MIS'TRANSLA'TED, pp. MIS'TRANSLA'TION, n. *-lā'-shŭn,* an erroneous version or translation.

MISTREADING, n. *mĭs-trĕd'ĭng* [*mis,* wrong, and *tread*]: in *OE.,* a false step; the choosing of a wrong path.

MISTREAT, v. *mĭs-trēt'* [*mis,* wrong, and *treat*]: to ill-treat; to abuse. MISTREAT'ING, imp. MISTREAT'ED, pp. MISTREAT'MENT, n. *-mĕnt,* ill-treatment; abuse.

MISTRESS, n. *mĭs'trĕs* [OF. *maistresse;* F. *maîtresse,* fem. of *maître,* master: L. *magistra,* a mistress]: the fem. of *master;* a woman who instructs or governs a school; a female teacher; a woman who governs or holds authority; a woman beloved and courted; a term of address applied to a married untitled woman, now contracted into and written Mrs.; the female head of a family; a concubine; a woman who holds something in possession; a woman who has skill in something. MISTRESS OF THE WORLD, a name of Old Rome, in respect of the wide and far-reaching extent of her dominions and power. MISTRESS OF THE ROBES, a post in the queen's household, held by a lady of high rank, but its duties may often be performed by deputy—so named from having charge of the queen's robes.

MISTRUST, n. *mĭs-trŭst'* [*mis,* wrong, and *trust*]: want of confidence or trust; suspicion: V. to doubt; to suspect; to regard with suspicion. MISTRUST'ING, imp. MISTRUST'ED, pp. MISTRUST'FUL, a. *-fûl,* suspicious; wanting confidence in. MISTRUST'FULLY, ad. *-lĭ.*

MISTUNE, v. *mĭs-tūn'* [*mis,* wrong, and *tune*]: to tune wrongly; to put out of tune. MISTU'NING, imp. MISTUNED', pp. *-tūnd'.*

MISTY, MISTILY, MISTINESS. See under MIST.

MISUNDERSTAND, v. *mĭs'ŭn-dĕr-stănd'* [*mis,* wrong, and *understand*]: to take in a wrong sense; to misconceive. MIS'UNDERSTAND'ING, imp.: N. a mistake of the meaning; an error; a softer name for a quarrel; disagreement; dissension or slight difference. MIS'UNDERSTOOD', pt. and pp. *-stûd',* did take in a wrong sense; understood wrongly.

MISUSAGE, n. *mĭs-ū'zāj* [*mis,* wrong, and *usage*]: ill-usage; abuse.

MISUSE, v. *mĭs-ūz'* [*mis,* wrong, and *use*]: to treat or use improperly; to treat ill; to use to a bad purpose: N. *mĭs-ūs',* improper use; ill-treatment; wrong application. MISU'SING, imp. *-zĭng.* MISUSED, pp. *mĭs-ūzd'.*—SYN. of 'misuse, v.': to abuse; misapply; misemploy; maltreat.

MISWEEN, v. *mĭs-wēn'* [*mis,* wrong, and *ween*]: in *OE.,* to misjudge; to mistrust.

MISWEND, v. *mĭs-wĕnd'* [*mis,* wrong, and *wend*]: in *OE.,* to go wrong.

MISY, n. *mī'sĭ* [a miner's name]: an impure sulphate of peroxide of iron, a mineral of a fine bright-yellow color, and of friable structure.

MITÂKSHARÂ: name of several commentatorial works in Sanskrit—e.g., of a commentary on the text-book of the Vedânta philosophy, of a commentary on the Mîmânsâ work of Kumârila, of a commentary on the Br'ihadâran'-yaka (see VEDA), etc. The most renowned work, however, bearing this title is a detailed commentary by Vijnânes'-wara (called also Vijnânanâtha), on the law-book of Yâjnavalkya (q.v.); and its authority and influence are so great that 'it is received in all the schools of Hindu law from Benares to the southern extremity of the peninsula of India as the chief groundwork of the doctrines which they follow, and as an authority from which they rarely dissent' (cf. two treatises on the Hindu law of inheritance, translated by H. T. Colebrooke, Calcutta 1810). Most of the other renowned law-books of recent date, such as the Smr'iti-Chandrikâ, which prevails in southern India, the Chintâman'i, Vîramitrodaya, and Mayûkha, which are authoritative severally in Mithilâ, Benares, and with the Mahrattas, generally defer to the decisions of the Mitâksharâ; the Dâyabhâga of Jimûta-vâhana alone, which is adopted by the Bengal school, differs on almost every disputed point from the Mitâksharâ, and does not acknowledge its authority. The Mitâksharâ, following the arrangement of its text-work, the code of Yâjnavalkya, treats in its first part of duties in general; in its second, of private and administrative law; in its third, of purification, penance, devotion, etc.; but since it frequently quotes other legislators, expounding their texts, and contrasting them with those of Yâjnavalkya, it is not merely a commentary, but supplies the place of a regular digest. The text of the Mitâksharâ has been edited several times in India. An excellent translation of its chapter 'On Inheritance,' was published by Colebrooke in the work above referred to; and its explanation of Yâjnavalkya is followed by the same celebrated scholar in his *Digest of Hindu Law.*

MI'TAU. See MITTAU.

MITCHEL, *mĭch'ĕl*, JOHN: 1815, Nov. 3—1875, Mar. 20: b. Dungiven, Ireland. He graduated, 1836, from Trinity College, and practiced law several years, meanwhile writing for the press. In 1845 he became editor of the Dublin *Nation* and about this time published the *Life of Hugh O'Neil.* In 1848 he left the *Nation* and established the *United Irishman,* which in about three months was suppressed on account of its violent revolutionary utterances, and Mitchel was sentenced to transportation for 14 years. He was taken to Bermuda, and later to Australia. He escaped, 1853, to New York, where he established a pro-slavery paper and published his *Jail Journal.* He afterward published papers in Knoxville,

Tenn., and Richmond, Va.; returned to Ireland 1874, and was elected to parliament, but was not allowed to serve. He was elected again but died at Cork before his case was decided. He edited the poems of Thomas Davis and James C. Mangan, wrote *The Last Conquest of Ireland—Perhaps,* and continued McGeoghegan's *History of Ireland.*

MITCH'EL, Ormsby Macknight, ll.d.: 1810, Aug. 28—1862, Oct. 30; b. Morganfield, Ky.: astronomer and soldier. His childhood was spent in Lebanon, Ohio, where he gained a good knowledge of Greek, Latin, and mathematics. When 13 years of age he became clerk in a store at Miami, but later returned to Lebanon. In 1825, June, he entered West Point Milit. Acad., from which he graduated 1829. Among his classmates were Robert E. Lee and Joseph E. Johnston. For two years he was assistant professor in the mathematical department of the institution and held the rank of 2d lieutenant of artillery. In 1832, he was stationed at St. Augustine, Fla., but soon resigned. He studied law, was admitted to practice in Cincinnati, and also held the position of chief engineer of a railroad. In 1834, he was chosen professor of mathematics, philosophy, and astronomy, in Cincinnati College, which position he held till 1844, when he was made director of a large observatory which had been erected in Cincinnati mainly through his efforts, and in behalf of which he had delivered many lectures and made a trip to Europe. In 1859, he became director of the Dudley observatory, Albany, N. Y., for which he had drawn the plans; but he still retained his connection with the Cincinnati institution. He invented and perfected various astronomical instruments of great value, and made a large number of important observations. At the opening of the civil war he entered the army, and 1861, Aug. 9, was appointed brigadier-general of Ohio volunteers. He fortified the city of Cincinnati, served in various southern states, and won fame in the great railroad raid of 1862 in n. Alabama. He was, 1862, Apr. 11, appointed major-general; in September of that year was assigned to the department of the south, and while actively arranging for the campaign was taken with yellow fever and died at Beaufort, S. C. The observatory which he founded at Cincinnati has been removed to Mount Lookout, has received his name, and is supported by the city. He was a most interesting and instructive popular lecturer on astronomy, and a member of scientific societies in this country and Europe. Gen. Mitchel's mind was singularly clear and penetrating, he was prompt and decisive in action, undismayed by any dangers or difficulties, and nobly devoted to high aims. He published, 1846-48, a paper devoted to astronomical matters, revised Burritt's *Geography of the Heavens,* and wrote *The Planetary and Stellar Worlds; The Orbs of Heaven; A Concise Elementary Treatise of the Sun, Planets, Satellites, and Comets;*

and *The Astronomy of the Bible.* His life was published 1865, by the Rev. P. C. Headley, and by his son, Frederick A. Mitchel, 1887.

MITCHELL: S. Dak., city, county-seat of Davidson county; on two divisions of the Chicago, M. & St. P., and on the Chicago, St. P., M. & O. railroads; southeast of the central part of the state and about 68 miles west by north of Sioux Falls. It was settled in 1879, and incorporated as a city in 1883. It is situated in an agricultural region in which wheat is one of the great crops, and considerable attention is given to raising stock for the eastern markets. The industrial establishments are railroad shops, machine shops, lumber and brick yards, stock-yards, a creamery, and grain elevators. Mitchell ships large quantities of wheat and live stock. The three banks have a combined capital of $125,000. It is the seat of Dakota University, founded in 1885 under the auspices of the Methodist Episcopal Church, and it has good public and parish schools. There are nine church edifices. The government is administered under a general law charter of 1890, and is vested in a mayor who holds office two years, and a council of eight members, four of whom are elected each year. The waterworks are owned and operated by the city. Pop. (1890) 2,217; (1900) 4,055.

MITCHELL, Clifford, m.d.: American physician: b. Nantucket, Mass., 1854, Jan. 28. He was graduated at Harvard in 1875; studied medicine in Chicago in the Medical College and the Homœopathic Medical College; began to practise in Chicago in 1878; and devoted himself to diseases of the kidneys. In 1902, he established the Chicago Laboratory for Clinical Diagnosis. He is professor of chemistry, toxicology and renal diseases in the Chicago Homœopathic College and author of *Student's Manual of Urinary Analysis* (1879), *Physician's Chemistry* (1884), *Dentist's Manual of Special Chemistry* (1887), *Renal Therapeutics* (1898), and *Diseases of the Urinary Organs* (1903), etc.

MITCH'ELL, Donald Grant, ll.d. b. Norwich, Conn., 1822, Apr. 12. He studied at Ellington (Conn.) Acad., and graduated from Yale 1841. For the next three years he worked on a farm for improvement of his health. He contributed articles to the Albany *Cultivator,* and drew a set of plans for farm buildings which won a silver medal from the N. Y. Agricultural Soc. He travelled in Europe 1844-46, and in 1847 published his first book, *Fresh Gleanings.* He studied law in New York, and, 1848, again went abroad; he was at Paris when the outbreak of that year occurred, and published his observations under the title *The Battle Summer. The Lorgnette* followed, 1850, and was soon succeeded by *Reveries of a Bachelor,* which was remarkably popular, and *Dream Life,* which won nearly equal fame. He was married, 1853, and imme-

diately sailed to Venice, to which place he had been appointed U. S. consul. He published *Fudge Doings* 1854; and 1855 purchased Edgewood, a beautiful farm near New Haven, Conn., which has been made famous by his books on rural life, *My Farm of Edgewood* and *Wet Days at Edgewood.* Among his other works are *Seven Stories; Doctor Johns; Rural Studies; Pictures of Edgewood; About Old Story-tellers; Out of Town Places; English Lands, Letters, and Kings* (1889); and *American Lands and Letters* (1897). At the Paris exposition, 1878, he was U. S. commissioner. Several of his books have appeared under the authorship name 'Ik Marvel.'

MITCHELL, ELISHA: American scientist: b. Washington, Conn., 1793, Aug. 19; d. on Mount Mitchell, N. C., 1857, June 27. He was graduated at Yale in 1813; four years later became professor of mathematics in the University of North Carolina; and in 1826 was made professor of chemistry, mineralogy and geology in the same institution. The Olmsted-Mitchell Geological Survey (1824-8) did important work under his supervision. He discovered that a peak in North Carolina is the highest in the eastern states and was killed by a fall from this height, which is now called in his honor Mount Mitchell or Mitchell's High Peak, and on whose summit he is buried.

MITCHELL, HENRY: American civil engineer: b. Nantucket, Mass., 1830, Sep. 16; d. Boston, Mass., 1902, Dec. 11. He was a son of William Mitchell (q.v.), was educated at the Normal School in Bridgewater, Mass., and in 1851 was appointed to government service as a civil engineer under the United States coast survey. He acted as assistant to the commissioners on harbor encroachments in New York in 1859 and discovered the underflow of the Hudson. He was later engaged in Boston harbor and assisted in the improvement of the mouth of the Mississippi in 1874. He made an investigation of the Panama canal scheme under De Lesseps and held many government commissions to investigate various harbors. He was appointed professor of physical hydrology at the Massachusetts Institute of Technology in 1869, and in 1873 was offered the same post in the Agassiz School of Science but resigned. He published many reports of surveys, etc.

MITCHELL, HINCKLEY GILBERT, A.M., PH.D., D.D.: American Biblical scholar: b. Lee, Oneida county, N. Y., 1846, Feb. 22. He studied at Wesleyan University, where he was graduated in 1873, at the theological department of Boston University, and at the University of Leipsic. He was instructor at Wesleyan 1880-3, and from 1883-1905 was professor of Hebrew and Old Testament exegesis in Boston University. His most important publications are *Hebrew Lessons* (1884); *Amos* (1893); *The Pentateuch* (1893); *The Theology of the Old Testament*

(a translation from the French of Piepenbring, 1893); *Isaiah, Chapters i.-xii.* (1900); *The World Before Abraham* (1901); *Tales Told in Palestine,* with J. E. Hanauer; etc.

MITCHELL, JOHN: American labor leader: b. Braidwood, Will county, Ill., 1870, Feb. 4. He entered the mines at Braidwood at the age of 13, and in 1885 joined the Knights of Labor. The next few years he spent coal mining in different states of the West and Southwest, and in 1890 settled at Spring Valley, continuing his work at his trade. He read and studied constantly, and was a member of several debating societies and reform clubs; he was also active in the labor movement, and was president of the Knights of Labor local at Spring Valley. On the formation of the United Mine Workers in 1890 he became a member of that organization, was frequently delegate to district conventions and in 1895 was elected secretary-treasurer of the northern Illinois sub-district; in 1896, he was chairman of the Illinois mine workers' legislative committee, and in 1897 was made a national organizer of the United Mine Workers. In 1898, Jan., he was elected vice-president of that organization, and in September of the same year became acting president; he was elected president in 1899, and was annually reëlected until he retired in 1908; he has also been a vice-president of the American Federation of Labor since 1898. After he became president of the United Mine Workers the union was enlarged, wages increased, and the eight hour day extended; he conducted the strikes of the anthracite miners in 1900 and 1902, and brought the latter to a close by his offer in behalf of the miners to accept the decisions of a commission appointed by the President of the United States. He is also a member of the Industrial Department of the National Civic Federation.

MITCHELL, JOHN AMES: American editor and author: b. New York, 1845, Jan. 17. He was educated at Harvard and studied in Boston and Paris and was an architect in Boston in 1870-6, after which he became interested in decorative art and studied art in Paris 1876-80. Returning to New York he engaged in journalism as artist, illustrator and writer and in 1883 founded and has since edited *Life.* He has published: *Croquis de l'Exposition* (1879); *The Romance of the Moon* (1886); *The Last American* (1889); *Amos Judd* (1895); *The Pines of Lory* (1901); *The Villa Claudia* (1904); *The Silent War* (1906); etc.

MITCH'ELL, JOHN INSCHO: b. Tioga, Pa., 1838, July 28; d. 1907. He attended the common schools, and when 18 years of age entered Lewisburg Univ., where he remained two years. After teaching school he became a student in a law office, but on the opening of the civil war he entered the Union army as 2d lieutenant. He was promoted captain for bravery at Chancellorsville. After

completing his studies he was admitted to the bar 1864, was district attorney 1868-71, in the latter year was elected to the Pennsylvania house of representatives, and soon became leader of the republican side of the house. By successive reëlections he held this office till 1876, when he was elected representative to congress; he was reëlected 1878; declined renomination 1880. In 1881, he entered the U. S. senate for a term of six years. In 1900, he became a judge of the superior court of Pennsylvania.

MITCHELL, MARGARET JULIA ('MAGGIE MITCHELL'): American actress: b. New York, 1832. She made her first appearance on the stage as an infant and before she was five had taken child parts. She made her début as Julia in *The Soldier's Daughter* at Burton's Chambers Street Theatre in New York, and as Fanchon, the Cricket, produced in 1860, she made herself famous. She was married to Henry Paddock, her manager, 1868, Oct. 15, and continued her career on the stage, playing in many famous roles: *The Pearl of Savoy; Nan the Good for Nothing; Jane Eyre;* etc., until her retirement.

MITCH'ELL, MARIA, PH.D., LL.D.: 1818, Aug. 1—1889, June 28; b. Nantucket, Mass.: astronomer. She was taught by her father, and in the school of Prof. Pierce, in which she was also assistant teacher. When 18 years of age she became librarian of the Nantucket Athenæum, which position she held about 20 years, meanwhile pursuing mathematical and astronomical studies. From her early years she had assisted her father in making observations; and, 1847, Oct. 1, she discovered a comet for which she was awarded the prize of a gold medal by the king of Denmark. She made observations for the U. S. Coast Survey and compilations for the *Nautical Almanac.* During a tour in Europe, 1858, she visited the principal observatories and was an honored guest of the leading scientists. Upon her return she was presented with a fine telescope by the women of America. In 1865, she became director of the observatory and professor of astronomy at Vassar College. Early in 1888 she resigned, on account of ill health and advancing years. Her resignation was not accepted, but she was made professor emeritus. She was a member of the American Association for the Advancement of Science, and was given the degree of LL.D. by Hanover in 1852 and by Columbia in 1887. She was a believer in woman's suffrage, but not active in the suffragist movement; she was, however, a member, and for several years president, of the American Association for the Advancement of Women.

MITCH'ELL, PETER: b. Newcastle, New Brunswick, 1824, Jan. 4; d. Montreal, 1899, Oct. 25. He was educated in his native town, and, 1848, was admitted to the bar, but soon became interested in ship-building and politics. He was chosen, 1856, representative to the pro-

vincial parliament, and after five years of service in that capacity was made life member of the legislative council. He was prominent in the movement for confederation of the provinces of Brit. America and for construction of the Intercolonial railroad, and was repeatedly chosen delegate to Canada and England in behalf of these projects. He served in the senate several years, but resigned 1872, and was minister of marine and fisheries under the Macdonald administration. He was elected representative, 1882, from his native county to the Dominion parliament, was one of the chief promoters of the Canada Pacific railway, and for several years was president of the company publishing the Montreal *Herald.*

MITCHELL, SAMUEL AUGUSTUS: American geographer: b. Bristol, Conn., 1792, Mar. 30; d. Philadelphia, 1868, Dec. 20. His early life was devoted to teaching, in which he was very successful, but the inadequate treatment of geography by the text-books then in use induced him to turn his attention to the making of satisfactory ones and he spent 40 years in Philadelphia in the preparation of his text-books on that subject. So general was their adoption that they reached a sale of 400,000 annually. Besides his geographical text-books, of which there were 24, he edited a new edition of John James Audubon's *Birds of America,* and wrote: *General View of the World, Physical, Political, and Statistical* (1846), and *New Traveller's Guide through the United States* (1850).

MITCHELL, SILAS WEIR, M.D., LL.D.: American physician, poet, and novelist: b. Philadelphia, 1829, Feb. 15. He studied at the University of Pennsylvania, was graduated from Jefferson Medical College in 1850, entered practice in Philadelphia, during the civil war was in charge of the Turner's Lane United States hospital (Philadelphia) for diseases and injuries of the nervous system, and subsequently was president of the Philadelphia College of Physicians. In his professional capacity he became known for his researches in connection with nervous diseases, and in physiology and toxicology. A bibliography of his publications would supply the titles of some 150 medical papers, recounting investigations of high scientific importance. To a wider degree, however, he is known through his literary work, composed principally of poetry and fiction. He was elected to the American Academy of Arts and Sciences and the National Academy of Sciences, and was also made associate, corresponding, or honorary member of foreign scientific societies. His works in medical science include: *Researches on the Venom of the Rattlesnake* (1860); *Gunshot Wounds and Other Injuries of Nerves; Reflex Paralysis* (1864); *On Injuries of the Nerves and Their Consequences* (1872); and *Fat and Blood, and How to Make Them* (1877). Among his other writings are, in verse, *The Hill of Stones* (1882); *A Masque* (1887);

The Psalm of Death (1890), and *The Wager* (1900); in fiction, *Roland Blake* (1884); *Far in the Forest* (1888); *A Madeira Party* (1895); *Hugh Wynne* (1897); *The Adventures of François* (1899); *The Autobiography of a Quack* (1900); *Circumstance* (1901); *Collected Poems* (1896); *Memoir of Owen Jones* (1896); *Constance Trescot* (1905); etc.

MITCHELL, WALTER, A.M.: American Protestant Episcopal clergyman: b. Nantucket, Mass., 1826, Jan. 22. He was graduated from Harvard in 1846 and admitted to the bar in 1849, but deciding to enter the Episcopal ministry, received ordination to the priesthood in 1860. He held many important charges and was for a time chaplain of Kenyon College, Gambier, Ohio, and has now retired from active service. He has published: *Two Strings to His Bow; Bryan Maurice;* etc.

MITCHELL, WILLIAM: American astronomer: b. Nantucket, Mass., 1791, Dec. 20; d. Poughkeepsie, N. Y., 1868, Apr. 19. He taught for a time, became cashier of the Pacific bank in Nantucket, and made a long series of investigations in connection with the United States coast survey studies of the figure of the earth. Besides lecturing on astronomy in Boston and elsewhere, he contributed to the *American Journal of Science,* and supplied time to whaling vessels. He was elected to the American Academy of Arts and Sciences.

MITCHILL, SAMUEL LATHAM: American physician: b. North Hempstead, L. I., 1764, Aug. 20; d. New York 1831, Sep. 7. He was graduated M.D. at the University of Edinburgh in 1786, and in 1788 was a commissioner for treating with the Iroquois Indians for the purchase of land. In 1792 he was appointed professor of chemistry, natural history, and philosophy in Columbia College, where he first introduced the system of nomenclature invented by Lavoisier. In 1797 he founded with Dr. Edward Miller and Elihu H. Smith the quarterly *Medical Repository,* of which he continued the editor for 16 years. It was the first scientific periodical published in the United States. In 1801 he became a representative in congress, and in 1804 was chosen to the United States senate. At the expiration of his term of office he was again elected to the house of representatives. On the establishment of the college of physicians and surgeons he was appointed (1808) professor of natural history, becoming in 1820 professor of botany and materia medica. The institution in 1826 gave place to the Rutgers Medical School, of which Dr. Mitchill became vice-president. Though widely respected in his lifetime as a man of extraordinary learning, he was occasionally the victim of the satirical wits of New York, and the poems of 'Croaker & Co.,' to which Fitz-Greene Halleck was a contributor, contain records of some of his eccentricities. He proposed to change the name of this country to 'Fredonia,' and wrote in 1804 'An Address to the Fredes, or

People of the United States.' He was one of the early supporters of Robert Fulton, whom he accompanied in 1807 in the first steamboat journey on the Hudson. He was the author of *Observations on the Absorbent Tubes of Animal Bodies* (1787); *Nomenclature of the New Chemistry* (1794); *Life, Exploits, and Precepts of Tammany, the Famous Indian Chief,* a half historical, half fanciful address before the Tammany Society of New York (1795); etc. Consult: Francis, *Reminiscences of Samuel Latham Mitchill* (1859).

MITE, n. *mīt* [OF. *mite,* the smallest of coins—from O.Dut. *mijte,* small: Dut. *mijt,* a very small coin: OE. *mynutis,* a very small coin: Port. *miudo,* little (see MINUTE 1)]: in *Scrip.,* a small coin, equal to about one-third of a farthing (about one-sixth of a cent): the OE. mite was of about the same value; a very little thing; a minute particle.

MITE, n. *mīt* [Dut. *mijte;* Sp. *mita;* F. *mite,* a mite: prov. Sw. *smit;* Gael. *smiot,* a particle: Gr. *midas,* a little creature that eats beans]: small insect not easily seen by the naked eye, found in cheese and many other substances. MITY, a. *mī'tĭ,* containing mites.—*Mite* is a name given to the *Acarides* generally (see ACARUS); sometimes only to those of them which have the feet formed for walking, and the mouth furnished, not with a sucker formed of lancet-like plates, as in the Ticks (q.v.), but with mandibles. All are small creatures; the species are very numerous; they feed chiefly on decaying animal and vegetable substances, or are parasitical on quadrupeds, birds, and insects. The CHEESE MITE (*Acarus domesticus*) is one of the best known species; another is the FLOUR MITE (*A. farinæ*), too common among flour, in both of which the body is covered with hairs very large in proportion to its size, and capable of a considerable amount of motion. The SUGAR MITE (*A. saccharinus*) swarms in almost all *soft* sugar; but refined and crystallized sugar seems to defy its mandibles, and is free of it. The surface of jelly and preserves, when it has begun to become dry, is often covered with multitudes of very small mites. A species of mite is the cause of Itch (q.v.); and many of the lower animals are infested by parasites of this tribe. Beetles may often be seen absolutely loaded by a species which preys on them; and bird-fanciers regard with the utmost horror the RED MITE, which lurks in crevices of cages and aviaries, and sucks the blood, and eats the feathers of their inmates.

MI'TER. See MITRE.

MITFORD, *mĭt'ford,* MARY RUSSELL: English authoress: 1786, Dec. 16—1855, Jan. 10; b. Alresford, Hants; only child of a physician. At the age of ten, she was sent to a boarding-school at Chelsea, and also placed under the guidance and tuition of Miss Rowden, a lady of literary turn, who had educated Lady Caroline Lamb, and was afterward instructress of Miss Landon and of Fanny

Kemble. During the five years that she spent at Chelsea, she read with avidity, studying the tragic authors of France, Shakespeare, and the early dramatists of England. At the age of 15, she returned home, and before she was 20, she published three vols. of poetry. These having been severely castigated by the *Quarterly Review*, she applied herself to writing tales and sketches for the magazines. The profession which she had adopted from taste she continued from necessity; for her father, an idle and spendthrift gentleman, had exhausted a fortune of £20,000 drawn as a lottery prize, which left him dependent on his daughter, who exercised over him a motherly care, and indulged him in the exactions which were natural to his easy good-nature. The first vol. of *Our Village* appeared 1824, and the five vols. completed 1832. Of the more important of her dramatic works, *Julian* was performed first 1823; *Foscari* 1826; and *Rienzi* 1828—all, especially the last, with success. Among her other important works, are *Recollections of a Literary Life* (3 vols. 1852); *Atherton* (a novel, 3 vols. 1854) *and other Tales*. Miss M. published a collected ed. of her dramatic works, 2 vols. 1854. In 1838, she received a pension from govt., but neither this, nor the growing ill-health of her later years, induced her to relax her literary industry. She died at her residence, Swallowfield Cottage, near Reading. Successful both as compiler and as author, Miss M. produced many interesting volumes; but her fame—if the admiring respect for an amiable lady and a woman of graceful literary genius may be so called—rests chiefly on the sketches of country life which compose *Our Village*. These sketches are memorable chiefly for their style, which is unaffected, spontaneous, vivacious, genial, and humorous, revealing a charming character. Five vols. of her Life and Letters appeared 1870–72; and two vols. of Letters to her, 1882.

MITFORD, William: 1744, Feb. 10—1827, Feb. 8; b. London. He studied at Queen's College, Oxford, but left the univ. without taking his degree. In 1761, he succeeded to the family estate; and 1769 became a capt. in the South Hampshire militia. M.'s first work, *An Inquiry into the Principles of Harmony in Languages, and of the Mechanism of Verse, Modern and Ancient*, appeared 1774; but by far his most important publication was his *History of Greece*, the first vol. of which appeared 1784, and the last 1818; a pugnacious, opinionated, and even fanatical production. The author is an intense hater of democracy, and can see in Philip of Macedon nothing but a great statesman, and in Demosthenes, nothing but an oratorical demagogue. Yet his zeal led him for substantiating his views, to search minutely and critically certain unexplored portions of Greek history; this gave M.'s work a high place in the opinion of scholars until the appearance of Thirlwall and Grote.

MITHRADATES, *mĭth-ra-dā'tēz*, improperly, MITHRIDATES [from Persian *Mithras* (q.v.) or *Mithra*, 'the sun,' and an Aryan root *da*, to give; hence 'sun-given' or 'sun-born']: name of several kings of Pontus, Armenia, Commagene, Parthia, and the Bosporus; all of whom have sunk into insignificance, with the exception of Mithradates VI. of Pontus, surnamed EUPATOR and DIONYSUS, but more generally known as M. THE GREAT: prob. abt. B.C. 132–63 (reigned about B.C. 120–63). Little is known of his early career. He succeeded his father before 13 years of age, and soon subdued the tribes who bordered on the Euxine, as far as the Chersonesus Taurica (Crimea); and after the death of Parysatis, incorporated the kingdom of the Bosporus with his dominions. The jealous behavior of the Romans and the promptings of his own ambitious spirit incited him to invade Cappadocia and Bithynia, but a wholesome fear of the power of the Great Republic induced him to restore his conquests. The *First Mithridatic War* was commenced by the king of Bithynia B.C. 88, who, at the instigation of the Romans, invaded Pontus. M. sent an ambassador to Rome to complain of this treatment, but he was sent back with an evasive reply. M. immediately began hostilities, and his generals repeatedly defeated the Asiatic levies of the Romans, and he himself took possession of Bithynia, Cappadocia, Phrygia, and the Roman possessions in Asia Minor, the inhabitants of which last hailed him as deliverer. By his orders, a great massacre of the Romans took place, in which, according to one account, 80,000, according to another 150,000 were slain. He also sent three powerful armies to aid the Greeks in their rebellion, but the disastrous battles of Chæronea and Orchomenus broke his power in that country. He was driven from Pergamus B.C. 85 by Flavius Fimbria, and reduced to the necessity of making peace with Sulla, relinquishing all his conquests in Asia, giving up 70 war-galleys to the Romans, and paying 2,000 talents. The wanton aggressions of Murena, Roman legate, gave rise to the *Second Mithridatic War*, B.C. 83. M. was wholly successful in this war, but peace was concluded on the *status quo*, B.C. 81. M. felt, however, that this was merely a truce, and lost no time in preparing for a third contest, in alliance with Tigranes, King of Armenia, the next most powerful monarch of w. Asia. Tigranes seized Cappadocia B.C. 76, and M., in the following year, invaded Bithynia, commencing the *Third Mithridatic War*. M. formed an alliance with Sertorius (q.v.), and obtained the services of Roman officers of the Marian party, who trained his army after the Roman manner. The arms of M. were at first successful; but afterward the Roman consul Lucullus (q.v.) compelled him to take refuge with Tigranes, B.C. 72. Lucullus then conquered Pontus, defeated Tigranes, B.C. 69, at Tigranocerta, and both Tigranes and M. at Artaxata, B.C. 68. M., however, recovered possession of Pontus. After the war had

lingered some time, Cneius Pompeius (see POMPEY), completed the work of Lucullus, defeating M. on the Euphrates B.C. 66, and compelling him to flee to the Bosporus. Here his indomitable spirit prompted him to a new scheme of vengeance, but it was frustrated by the rebellion of his son, Pharnaces, who beseiged him in Panticapaœum. Deeming his cause hopeless, M. put an end to his own life. M. was a specimen of the true eastern despot; he had the ability that is given by irresponsible power, unbounded ambition, and merciless hate of foes, and that manifests itself in courage, extraordinary energy, and perseverance. His treachery and cruelty were frightful; he murdered his mother, his sons, his sister, who was also his wife, his concubines, and his most intimate friends. Superstition became to him a science; he was a great student of magic, and the accounts of him which pass for history read like extracts from the *Arabian Nights*. His physical stature and strength were wonderful. His want of success was owing not altogether to his defects as a general, but largely to the impossibility of raising and training an army of Asiatics capable of coping with the Roman legions; and his system of tactics during the third Mithridatic war plainly shows his conviction of this fact. He had received a Greek education with its outward polish at Sinope, could speak 22 different languages and dialects, and possessed considerable love for the arts, of which his magnificent collections of pictures, statues, and engraved gems were a proof. In the estimation of the Romans, he was the most formidable opponent they ever encountered, and occasional reports of his successes spread terror among them.

MITHRAS, *mĭth'ras* (cf. Sanskrit *Mitram*, friend): highest of the 28 second-class divinities of the anc. Persian Pantheon, the *Ized* (Zend. *Yazata*) or genius of the bright heaven or the day, and ruler of the universe. Later, M. became quite identified with the sun as a god. Protector and supporter of man in this life, he was believed to watch over his soul in the next, defending it against the impure spirits, and transferring it into the realms of eternal bliss. In the Persian mythology, he is all-seeing and all-hearing, and, armed with a club—his weapon against Ahriman and the evil *Dews*—he unceasingly 'runs his course' between heaven and earth. The ancient monuments represent him as a beautiful youth, in Phrygian garb, kneeling on an ox, into whose neck he plunges a knife; several minor, varying, allegorical emblems of the sun and his course, surrounding the group. At times, he is represented as a lion, or the head of a lion. The most important of his many festivals was his birthday, celebrated Dec. 25. The worship of M. early found its way into Rome; it was regularly established by Trajan about A.D. 100, and the mysteries of M. (*Hierocoracica*, *Coracica Sacra*), which fell in the spring equinox, were famous even among the many Roman festivals. The ceremonies observed in the initiation

to these mysteries—symbolical of the struggle between Ahriman and Ormuzd (the Good and the Evil)—were extraordinary and even dangerous. Baptism and the partaking of a mystical liquid, consisting of flour and water, to be drunk with the utterance of sacred formulas, were among the inaugurative acts. The seven degrees—according to the number of the planets—were, 1. Soldiers: 2. Lions (in the case of men), or Hyenas (in that of women): 3. Ravens: 4. Degree of *Perses:* 5. of *Oromios:* 6. of *Helios:* 7. of Fathers—the highest—called also Eagles and Hawks. At first, it was a merry worship—thus the king of Persia was allowed to become drunk only on the Feast of the Mysteries; but the solemnities gradually assumed a rigorous aspect. From Persia, the cultus of M. and the mysteries were imported into Asia Minor, Syria, Palestine, etc., and it is probable that in some parts human sacrifices were connected with it. Through Rome, where this worship, after many vain endeavors, was finally suppressed A.D. 378, it may be presumed that it found its way into w. and n. Europe; and many tokens of its former existence, e.g., in Germany, are still found, such as the M. monuments at Hedernheim, near Frankfurt-on-the-Maine, and at other places. Among chief authorities on this subject are Anquetil du Perron, Creuzer, Silvestre de Sacy, Lajard, O. Müller (*Denkmäler d. alten Kunst*). See GUEBRES: PARSEES: ZENDAVESTA.

MITIGATE, v. *mĭt'ĭ-gāt* [L. *mitigatus*, softened, allayed or eased—from *mitis*, soft, mild: It. *mitigáre:* F. *mitiger*]: to alleviate or ease, as sufferings; to reduce or lessen, as a penalty or a disease; to soften: to appease; to soothe. MIT'IGATING, imp.: ADJ. alleviating; moderating. MIT'IGATED, pp.: ADJ. alleviated; moderated. MITIGANT, a. *mĭt'ĭ-gănt*, softening; diminishing or easing, as pain: N. that which eases or lessens. MIT'IGATOR, n. *-gā-tĕr*, one who or that which mitigates. MITIGABLE, a. *mĭt'ĭ-gă-bl*, that may be alleviated or lessened. MIT'IGA'TION, n. *-gā'shŭn* [F.—L.]: the act of mitigating; the diminution or lessening of anything painful, severe, or calamitous. MIT'IGATIVE, a. *-gā-tĭv*, tending to lessen or alleviate.—SYN. of 'mitigate': to allay; alleviate; pacify; relieve; assuage; calm; abate; cool.

MITRAILLEUSE, n. *mĭt'rāl-yĕz'*, MIT'RAILLEUS'ES, n. plu. *-yāz'ĕz* [F.—from *mitraille*, case or grape shot: *mitrailler*, to fire with grape or case shot]: a many-barrelled gun, having the barrels laid together like a fagot of sticks, and securely attached to each other, loaded with great quickness by an apparatus at the breech, and discharged each barrel singly, or the whole nearly simultaneously: see REVOLVER: GATLING GUN. Also sometimes used, MITRAILLEUR, n. *mĭt'rāl-yăr'*. MITRAILLE, n. *mĭt-rāl'*, grape-shot.

MITRAL, a. *mī'trăl* [L. and Gr. *mitra*, a head-dress, a mitre]: having the form of a mitre; in *anat.*, applied to a valve attached to the circumference of the left auriculo-ventricular orifice, whose flaps are supposed to resemble the segment of a bishop's mitre; the bicuspid valve.

MITRE, n. *mī'tĕr* [F. *mitre*, an episcopal crown—from L. and Gr. *mitra*, a headband, a turban: It. *mitra*]: in *R. Cath. Ch.*, a sort of crown worn on solemn occasions by archbishops, bishops, and sometimes by abbots; episcopal dignity; the junction of objects, e.g., the point or line of union of moldings meeting at an angle usually of 45°: V. to adorn with a mitre; to unite at an angle of 45°. MITRING, imp. *mī'trĭng*. MITRED, pp. *mī'tĕrd:* ADJ. wearing or possessing a mitre; episcopal; cut or jointed to meet at an angle. MITRAL, a. *mī'trăl*, mitre-shaped; pertaining to a mitre. MITRE-BOX, a box or trough with vertical cuts through the sides to guide the saw in cutting work to form mitre-joints. MITRE-SQUARE, an immovable bevel for striking an angle of 45°. MITRE-WHEELS, in *mech.*, a pair of bevel-wheels of equal diameter working into each other, usually with their axes at right angles.

MI'TRE: head-dress worn in solemn church services by bishops, abbots, and certain other prelates in the Western Church. The name, as probably the ornament itself, is borrowed from the orientals, though, in its present form, it is not in use in the Greek Church, or in any other of the churches of the various eastern rites. The western M. is a tall, tongue-shaped cap, terminating in a twofold point supposed to symbolize the 'cloven tongues' in the form of which the Holy Spirit was imparted to the apostles (Acts ii. 3), and is furnished with two flaps, which fall behind over the shoulders. Opinion is divided as to the date at which the M. came first into use. Eusebius, Gregory of Nazianzus, Epiphanius, and others speak of an ornamented head-dress, worn in the church; but there is no very early monument or pictorial representation which exhibits any head-covering at all resembling the modern M. From the 9th c., however, it is found in use, though not universally; and instances are recorded in which the popes grant permission to certain bishops to wear the M.; e.g., Leo IV. to Anschar, Bp. of Hamburg, 9th c. The material used in the M. is very various, often consisting of most costly stuffs, studded with gold and precious stones. The color and material differ according to the festival or the service in which the M. is used, and there is a special prayer in the consecration service of bishops, used in investing the new bishop with his mitre. The M. of the pope is of peculiar form, and is called by the name of *Tiara* (q.v.). Although the mitre properly belongs to bishops

Mitre.

only, its use is also permitted by special privilege to certain abbots, to provosts of some distinguished cathedral chapters, and to a few other dignitaries. See Binterim, *Denkwürdigkeiten der Kirche*, 1 B. 2 Th. 348.

The M., as an ornament, seems to have descended in the earliest times from bishop to bishop. Among the Cottonian MSS. is an order, dated July 1, 4 Henry VI., for the delivery to Abp. Chichely of the M. worn by his predecessor. It was in some cases very costly. In England, after the Reformation, the M. was no longer a part of the episcopal costume till 1885, when it was resumed by the new Bp. of Lincoln; but in heraldry it is placed over the shield of an abp. or bp., instead of a crest. The M. of a bp. has its lower rim surrounded with a fillet of gold; but the Abps. of Canterbury and York are in the practice of encircling theirs with a ducal coronet, a usage of late date and doubtful propriety. The Bp. of Durham surrounds his M. with an earl's coronet, in consequence of being titular Count Palatine of Durham, and Earl of Sedburgh. Before the custom was introduced of bishops impaling the insignia of their sees with their family arms, they sometimes differenced their paternal coat by the addition of a M. Mitres are rare as a charge in heraldry, but are sometimes borne as a crest, particularly in Germany, to indicate that the bearers were feudatories, or dependencies of ancient abbeys.

MI'TRE SHELL: name for the shells of several species of *Mitra*, genus of gasteropods belonging to the family *Volutidæ*. These shells are of great beauty, especially that known as the bishop's mitre shell. The shell of *Mitra* is fusiform, thick, spire elevated, acute; aperture small, notched in front; columella obliquely plaited; operculum very small. The animal has a long proboscis; and, when irritated, emits a purple liquid having a very offensive smell. The eyes are situated on the tentacles or at their base. Over 100 fossil and 400 recent species have been described. In the bishop's (*M. episcopalis*), the animal has a narrow foot, compressed at its root, nearly square and slightly articulated in front with a margined furrow, and pointed behind; eyes sessile at the base of the tentacles; the proboscis twice the length of the shell. The shell is turreted, smooth, white, spotted with bright red; pillar four plaited; outer lip denticulated at its lower part; epidermis thin. It is found in E. Indian seas and islands of the S. Sea. The different species are found at depths varying from the surface to 17 fathoms, on reefs, sandy mud, and sands. They all are inhabitants of warm countries.

MITRIFORM, a. *mī'trĭ-fawrm* [L. *mitra*, a headband; *forma*, shape]: in *bot.*, shaped like a mitre; conical; hollow and open at the base.

MITSCHERLICH, *mĭt'shĕr-lĭch*, EILHARDT: Prussian chemist: 1794, Jan. 7—1863, Aug. 28; b. Neuende, near Jena. At the Univ. of Heidelberg he studied history, philology, and oriental languages; and later at Paris and Göttingen. At Göttingen (1814 or 15) he seems first to have turned his attention to geology and mineralogy, chemistry and physics; and at Berlin, 1818, he selected chemistry as his special study. His observations on the striking similarity between the crystalline form and the chemical composition of the arseniates and the phosphates, led to his discovery of the law of Isomorphism (q.v.), the importance of which was so fully recognized by Berzelius, that he invited the young chemist, 1819, to Stockholm, where he studied till 1821, when, on the death of Klaproth, he was, on recommendation of Berzelius, appointed to the vacant chair of chemistry at Berlin. One of his earliest discoveries after his appointment was that of the double crystalline form of sulphur, the first observed case of Dimorphism: see DIMORPHISM. His investigations regarding the formation of artificial minerals, and his memoirs on Benzine and on the Formation of Ether are among his most important contributions to chemistry; but mainly on the discovery of Isomorphism and Dimorphism his reputation will finally rest. His principal work is *Lehrbuch der Chemie*, begun 1829, concluded 1841. It has passed through five editions, and is especially valuable for the clear and simple way in which he has brought mathematics and physics to bear upon the subject. He was an honorary member of almost all the great scientific societies, and received the gold medal from the Royal Soc. of London for his discovery of the law of Isomorphism. He died at Berlin.

MITTAU, *mĭt'tow*, or MITAU, *mē'tow:* chief town of the govt. of Courland, European Russia; on the right bank of the Aa, 25 m. s.w. of Riga; founded 1271 by the grand master of the Teutonic Knights. It was annexed to Russia 1795. The majority of the people are Germans by birth or descent, 1,000 are Jews, and only a few Russians. The town is indifferently built, the houses being chiefly of wood, and painted green or brown. The most important buildings are the old castle—now the seat of the gov. of the province—four churches, an astronomical observatory, a public library, a museum, and a number of educational and charitable institutions. As regards commerce and industry, the town occupies only the third place in the govt., its principal product being articles of japanned iron and tin; there is export trade in hemp, flax, and corn. M. is the winter residence of the gentry of the surrounding country, and was for some time the abode of Louis XVIII. Pop. about 25,000.

MITTENS, n. plu. *mĭt'nz* [F. *mitaine*, a winter glove: comp. Gael. *mutan*, a muff, a thick glove; *mutag* and *miotag*, a glove without fingers]: rough coverings for the hands to protect them from the cold; gloves without a separate covering for each finger; gloves without fingers. TO HANDLE WITHOUT MITTENS, to use roughly

MITTIMUS, n. *mĭt'tĭ-mŭs* [L. *mittĭmus*, we send]: in *law*, writ for transfer of records from one court to another; warrant of commitment to prison, given by a magistrate —called usually a commitment: it is addressed to the keeper of the prison, and must describe with reasonable certainty the name (or if that be not known, the person) of the prisoner.

MITTS, n. plu. *mĭts* [contracted from *mittens*, which see]: gloves which do not cover each finger separately, which protect the hand without wholly covering the fingers.

MITTWEIDA, *mĭt'vī-dâ:* town of Saxony, circle of Zwickau, 35 m. s.e. of Leipzig. For centuries, M. has been noted for industry, of which the principal branches are spinning, cotton-weaving, manufacture of fustian, etc., together with dyeworks and bleach-fields. Pop. about 12,000.

MITY: see under MITE 1.

MITYLE'NE, or MYTILE'NE: see LESBOS.

MIVART, ST. GEORGE, PH.D., M.D., F.R.S.: naturalist, teacher, and author; 1827, Nov. 30; 1900, April 1. b. London, Eng. He studied at Clapham and Harrow schools, and at St. Mary's College (Rom. Cath.), Oscott. He was called to the bar 1851, but afterward turned to medical studies, and having taken his degree at St. Mary's, 1862, became prof. of biology in University college, Kensington, 1874; prof. of philosophy of nat. hist. at Louvain, 1890. He was author of numerous works, largely in opposition to certain aspects of Darwinism. Noteworthy are his *Genesis of Species* (1871), *Nature and Thought* (1883), *Origin of Human Reason* (1889), *Types of Animal Life* (1893).

MIX, v. *mĭks* [Ger. *mischen;* Bohem. *misyti;* Gr. *misgein*, to mix: L. *mixtus*, mingled or mixed: Gael. *masg*, to infuse, to mix: W. *mysgu*, to mix]: to mingle or blend two or more substances into one mass; to join or unite, as with a crowd; to associate; to become united or blended; to be joined or associated. MIX'ING, imp. MIXED, pp. *mĭkst:* ADJ. consisting of various kinds; promiscuous; not pure. MIXABLE, a. *mĭks'ă-bl*, that may or can be mixed. MIXER, n. *mĭks'ér*, one who or that which mixes. MIX'EDLY, ad. *-ĕd-lĭ.* MIXTURE, n. *mĭks'-tūr* or *-chûr* [L. *mixtūra*, a mingling together]: act of mixing; state of being mixed; a mass or compound formed by mixing two or more substances together; an ingredient added and mixed. In *medicine*, officinal preparations, extempore in their nature, some of which—e.g., *Mistura Camphoræ*, *Mistura Cretæ*, and *Mistura Ferri Composita*—are extensively used in medical practice, either as vehicles for more active remedies, or for their intrinsic value. In *organs*, a compound stop of two to five ranks of small metallic pipes, in tone resembling the sesquialtera, though more shrill.—SYN. of 'mix': to confuse; mingle; confound; associate; compound;—of 'mixture': compound; medley; union; association; admixture; intermixture; composition.

MIXED MARRIAGES: term applied to marriages between persons of differing religions, or of opposing forms of the same religion. In various countries of Europe, such marriages have either been prohibited or put under restrictions. The canon law forbade marriages between Christians and non-Christians; at one time it merely discouraged, at another altogether prohibited, the marriage of orthodox Christians with heretics. Subsequently to the Reformation, papal dispensations were in use to be granted for marriages between Rom. Catholics and Protestants, with the condition annexed that the children should be brought up in the Rom. Cath. faith. During the latter part of the 17th c., parents seem to have been left at liberty to make what agreement they pleased on this head; and in default of their making any, it was presumed that the children would follow the religion of their father. In the middle of the 18th c., the validity of mixed marriages, even when celebrated by the civil magistrate, was recognized by the papal court; and under Napoleon's rule they became common, without stipulations as to the children. The events of 1815 restored sufficient influence to the Rom. Cath. Church, to enable the clergy to put in force a rule by which they could refuse to celebrate such marriages without an assurance that the children would be brought up Rom. Catholics. By the law of many of the German states, the clergyman of the bride was the only person who could competently officiate, and an engagement of this kind was often not only repugnant to the father as a Prot., but illegal. Conflicts followed between the civil and ecclesiastical authorities, which have sometimes been obviated by the priest, on whom the law imposes the celebration of the marriage, not pronouncing the nuptial benediction, but giving his presence as a witness with two other witnesses when the parties declared themselves husband and wife—a kind of marriage whose validity is perfectly recognized by the canon law. In Spain, marriages between Rom. Catholics and Protestants have sometimes taken place in this way, avoiding the stipulations otherwise necessary regarding the children.

There was, till lately, great diversity in the state of the law of mixed marriages in different parts of Germany. Prussia was the first state to do away the former restrictions by the recognition of a civil ceremony alone as that which constitutes marriage in the eye of the law. Until that change, the letter of the law provided that the children should be brought up in the faith of their father, and no compacts to the contrary were allowed. Practically, however, the law was largely evaded, no one having a recognized interest to object to the fulfilment of such agreements. In Bavaria, mixed marriages might be performed either by Prot. or Rom. Cath. clergymen; and the spouses had it in their power to make what arrangements they pleased regarding the children before or after marriage; but if no such ar-

rangements had been made, the children were brought up in the religion of their father. In Saxony, and various other German states, the law was nearly the same. A bill for rendering civil marriage obligatory throughout the empire was brought before the Reichstag 1874, and passed 1875, thus extending the system of Prussia to all other German states. This bill enables men and women to be married independently of the consent of the clergy (not always easily obtained in Rom. Cath. districts), or of the difference of their religious beliefs. It also allows of children being left unbaptized, and brought up without being assigned to any religious denomination whatsoever. In Austria, the interposition of the Rom. Cath. priest is required in marriages between Rom. Catholic and Protestants. He need not, however, give the sacerdotal benediction; his passive assistance only is required, either in taking the declaration of the parties, which is followed by a Prot. ceremony, or by being present as a witness at the Prot. ceremony. When the husband is Rom. Cath., all the children must be brought up Rom. Catholics; when the husband is Prot. and the wife Rom. Cath., the sons follow the father and the daughters the mother. In Denmark, stipulations may be made before or after marriage, and can be altered by mutual consent of the parents, or, in some cases, even after the death of one of them. Mixed marriages were, till lately, altogether prohibited in some of the Rom. Cath. cantons of Switzerland, but they are now authorized in all the cantons by the federal laws: it is generally the clergyman of the husband's creed who officiates, but at Zürich the ceremony is performed in both churches. In most cases, the children are required to be educated in the religion of their father.

In most German states, marriages between Christians and Jews or Mohammedans used to be interdicted; but after 1849, the prohibitions were in individual cases dispensed with. In Denmark, such marriages have been permitted, on condition of the children being brought up Protestants. In Russia, the members of both Greek and Roman communions are prohibited from intermarrying with non-Christians: members of the orthodox Greek Church cannot marry Greek sectaries; but when an orthodox Russian marries a Prot. or Rom. Catholic, the benediction must be given in the Greek Church, and the children baptized in the Greek communion. When the parents are of different religions, but neither belongs to the Greek Church, ante-nuptial stipulations will be given effect; if none have been made, the sons follow the father's faith, the daughters the mother's.

In France, the law regards marriage as a purely civil contract, and recognizes only the civil celebration, which is completely separated from the religious rite. As the faith of the parents is not taken cognizance of, questions regarding the religious education of the children cannot arise before the civil tribunals.

The only restriction to which mixed marriages are now subjected in any part of the United Kingdom is applicable to Ireland only, that a marriage celebrated by a Rom. Cath. priest between a Rom. Catholic and a Protestant, or a person who within 12 months has been or professed to be a Protestant, or between two Protestants, is null.

In the United States, differences in religion are not the subject of legal prohibition or restriction in relation to marriage.

MIXED RACES: subject intimately connected with an enlarged study of ethnology. It involves a consideration of the phenomena attendant on the sexual union between individuals belonging to different varieties of the human race; e.g.—adopting the classification of Blumenbach—between the European and the negro or the American Indian; or between the American Indian and the negro; or between any of these three and individuals belonging to the Malay or Mongolian varieties. It is well understood that such unions are in general prolific; and not only so, but that their offspring is likewise prolific; and this fact is much relied on by some ethnologists, as an argument in favor of the unity of the human race. They reason thus: Were the different varieties of mankind distinct species, as has been frequently alleged, then it would necessarily follow that the offspring of such unions would prove as unfruitful as those between the horse and the ass, the goat and the sheep, the wolf and the dog; and similarly with respect to the hybrids among birds, insects, and plants. To sum up, in the words of Dr. Prichard, best exponent of this school of ethnology: 'It seems to be the well-established result of inquiries into the various tribes of organized beings, that the perpetuation of hybrids, whether of plants or animals, so as to produce new and intermediate tribes, is impossible. Now, unless all these observations are erroneous, or capable of some explanation that has not yet been pointed out, they lead, with the strongest force of analogical reasoning, to the conclusion, that a number of different tribes, such as the various races of men, must either be incapable of intermixing their stock, and thus always fated to remain separate from each other, or, if the contrary should be the fact, that all the races to whom the remark applies, are proved by it to belong to the same species.' Dr. Prichard further observes, that so far from such unions between members of different varieties of the human race proving unfruitful, or their offspring unfruitful, the opposite is the case;—e.g., in unions between the negro and the European, the most strongly marked varieties of our race. 'If we inquire,' he says, 'into the facts which relate to the intermixture of negroes and Europeans, it will be impossible to doubt the tendency of the so-termed Mulattoes to increase. The men of color, or the mixed race between the Creoles, and the negroes, are in many of the W. India Islands a

rapidly increasing people, and it would be very probable that they will eventually become the permanent masters of those islands, were it not for the great numerical superiority of the genuine negroes. In many parts of America they are also very numerous.' It is to America, indeed, both N. and S., that we must chiefly look for the numerous and varied phenomena resulting from this intermixture of races; for there are not only the negro and the European mingling their blood, but the negro and the American Indian, the European and the Indian, and the offspring of each of these with the offspring of the other, or with members of either of the parent stocks; added to which, of late years, the Chinese (of Mongolian race or variety) have appeared upon the scene, thus contributing greatly to the number of what are termed *human hybrids*. All these, however, are not equally fertile; and with respect even to the Mulattoes, it is alleged by writers of the Morton school of ethnology that they do not perpetuate themselves for more than a few generations. 'Nature,' says Squier, rather dogmatically, 'perpetuates no human hybrids—e.g., a permanent race of Mulattoes.' And Dr. Nott, adopting the classification of species laid down by Dr. Morton—namely, *Remote Species*, in which hybrids are never produced; *Allied Species*, which produce, *inter se*, an unfertile offspring; and *Proximate Species*, which produce with each other a fertile offspring—is of opinion that it is only by the union of southern or dark-skinned Europeans with negroes that thoroughly prolific Mulattoes are engendered, which is not the case in unions between individuals of the Anglo-Saxon and negro races. In arriving at this conclusion, we cannot avoid thinking that the author has been helped forward by the strong prejudice in the Southern States against all taint of negro blood. A more impartial writer, Prof. Wilson, in his *Prehistoric Man*, observes: 'There are upwards of four millions of people of African blood in the United States, and certainly not less than ten millions throughout the continent and islands of N. and S. America, and of these the larger proportion consists of hybrids [these figures are much less than the present number]. . . . It is impossible to determine with certainty how far the hybrid colored population of the United States is capable of permanency, either by the development of a fixed hybrid type, or by continuous fertility, until the predominant primary type reasserts its power, by their return to that of the original white or black parent, so long as the mixed breed is constantly augmented in the Southern States by means at variance with the natural and moral relations of social life' [these conditions have largely been changed]. As it is, the weight of evidence appears to be in favor of Dr. Prichard's view; but until the doctrine of hybridity is better undertood, and a more satisfactory answer to the vexed question, 'What is species?' has been supplied to us, we must deem it idle to pronounce dogmatically

on the subject: see HYBRID: SPECIES: MISCEGENATION: also ETHNOLOGY. The following is a list of half-castes given by Dr. Tschudi, 'with a few additions from other sources,' printed in the appendix to Prof. Wilson's valuable work above mentioned.

Father.	Mother.	Half-caste.
White,	Negro,	Mulatto.
White,	Indian,	Mestizo.
Indian,	Negro,	Chino.
White,	Mulatta,	Cuarteron.
White,	Mestiza,	Creole, only distinguished from the white by a pale brown complexion.
White,	Chinese,	Chino-blanco.
White,	Cuarterona,	Quintero.
White,	Quintera,	White.
Negro, N. A.	Indian,	Zambo or Cariboco.
Negro, S. A.,	Indian,	Mameluco.
Negro,	Mulatta,	Zambo-negro or Cubra.
Negro,	Mestiza,	Mulatto-oscuro.
Negro,	Chinese,	Zambo-Chino.
Negro,	Zamba,	Zambo-negro (perfectly black).
Negro,	Cuarterona,	Mulatto (rather dark).
Negro,	Quinterona,	Pardoc.
Indian,	Mulatta,	Chino-oscuro.
Indian,	Mestiza,	Mestizo-claro (frequently very beautiful).
Indian,	China,	Chino-cholo.
Indian,	Zamba,	Zambo-claro.
Indian,	China-Cholo,	Indian (with short frizzly hair).
Indian,	Cuarterona,	Mestizo (rather brown).
Indian,	Quintera,	Mestizo.
Mulatto,	Zamba,	Zambo.
Mulatto,	Mestiza,	Chino (of rather clear complexion).
Mulatto,	China,	Chino (rather dark).

MIXTECAS, *mēs-tā'kas*, or MIZTECS: one of the Indian nations of Mexico, who came at an early period from the n., took possession of the region now the states of Oajaca, Guerrero, and Puebla, and after the Aztec conquest maintained an independent position in Oajaca. The civilization which they possessed produced fortresses, cities, and temples, of which remarkable remains are still seen; and a literature of primitive character, from which some religious treatises were printed in Mixtecan in the 16th and 17th c. They believed in a heaven, called Sosola, and made use of caves in the mountains as sacred places. They had a progressive industry, and were governed as tribal democracies by independent chiefs. There are 11 reported dialects of the Mixtecan language, which has no *b*, *f*, *p*, or *r*; indicates the plural by *cahite*, 'many,' added to the singular; abounds in personal pronouns; and varies the negative particle with the tense of the verb. The M. are now good citizens of Mexico, abiding secure in their mountain fastnesses.

MIXTILINEAL, a. *mĭks'tĭ-lĭn'ē-ăl*, or MIX'TILIN'EAR, a. *-ē-ĕr* [L. *mixtus*, mixed; *linĕă*, a line]: containing or consisting of lines of various kinds, as straight and curved.

MIZZEN, n. *mĭz'n* [F. *misaine*, the foresail of a ship: It. *mezzana*, a triangular sail with a long sloping yard unequally divided, so that a small part at the lower end is before the mast—from *mezzo*, middle]: the aftermost of the sails of a ship: ADJ. hindmost; nearest the stern. MIZZEN MAST, the sternmost of the masts in a three-masted vessel, and also the smallest of the three. Above it, are the mizzen-topmast, the mizzen-top-gallant-mast, and the mizzen-royal. It supports the usual yards, and, in addition, the gaff and boom of the Spanker (q.v.).

MIZZLE, v. *mĭz'l* [Dut. *mist*, fog; *mieselen*, to rain fine: Low Ger. *musseln*, to mizzle]: to rain in very fine drops. MIZZLING, imp. *mĭz'lĭng*. MIZZLED, pp. *mĭz'ld*.

MNEMONICS, n. *nē-mŏn'ĭks* [Gr. *mnemē*, memory; *mnemŏnikos*, belonging to memory]: the art of improving the memory; a system of rules for memorizing. The schemes which are usually suggested are highly artificial and consist of fixing in the mind some arrangement of letters or words with which the terms to be remembered are associated. Psychologists agree that these ingenious methods for memory training are usually too cumbersome to be of any practical service. Mechanical means may profitably be employed, however, for memorizing disconnected lists of words. We find this illustrated in the rhymes for retaining the names of rulers of England, or presidents of the United States. Apart from changes in the general health which affect activity of the nervous system, the only way to improve the general memory according to the psychologist William James, is to improve the methods for increasing attention to the things, for repeating the impression of things, and for thinking the things over in their various relations, logically analyzing and classifying them. In these ways facts may be forced home by emphasizing them, and by building up more associations to aid in their recall.

MNEMOSYNE, *nē-mŏs'i-nē:* in classical mythology, goddess of Memory, and mother of the nine Muses (q.v.), whom she bore to Jupiter. The principal seat of her worship was at Eleutheræ, in Bœotia.

MOA, n. *mō'ă:* New Zealand name of the great wingless or struthious birds (see BREVIPENNES) of which the bones are found imbedded in the sands of the seashore, in swamps, forests, river-beds, and limestone caves. The largest bones belong to the genus *Dinornis* (q.v.), others to *Palapteryx* (q.v); and with them are found bones of a large bird (*Aptornis*), resembling a swan, supposed to be now extinct, also of the existing species of *Apteryx* (q.v.) and of *Notornis* (q.v.), much smaller birds. They are represented by the New Zealanders as stupid, fat, indolent birds, living in forests, mountain fastnesses, etc., and feeding on vegetable food. Their feet are said to have been adapted for digging. They seem to have been extirpated for the sake of their flesh, feathers, and bones.

MOABITES, *mō′ăb-īts:* pastoral people, descendants of Moab, son of Lot; former inhabitants of the mountainous country e. of the lower part of the Jordan and of the Dead Sea—known as the land of Moab, and about 3,000 ft. above the Jordan. By descent and in language the M. were related both to the Israelites and to the Edomites. Their heathenism was of the lowest grade. The national god was Chemosh. Baal-peor also was worshipped; though Jerome declares that the two are merely different conceptions of the same god. Their *cultus* was characterized by extreme licentiousness, and by many abominable rites, among which was human sacrifice (Am. ii. 1; II K iii. 27). In the time of the judges, the Jews were for 18 years under the yoke of the M., who were afterward made tributary by David, but, about B.C. 900, shook off their allegiance to the Jewish kings, and afterward took part with the Chaldeans against the Jews. The M. were a base and sensual people. Their name no longer exists, and the remnants of the people have long been included among the Arabs.

MO′ABITE STONE, THE: slab of black basalt, 3 ft. 8½ inches long, 2 ft. 3½ inches wide, 1 ft. 1·78 inches thick; bearing a long inscription in Hebrew-Phœnician letters; discovered by Mr. Klein of the British Missionary Soc., at Dibân in Moab 1868. It appears to have been erected by Mesha, King of Moab, mentioned in II Kings iii., and the inscription refers to his wars with Israel (B.C. 10th c.). Its date may be taken as about B.C. 890. The negotiations set on foot for its purchase led to quarrels among the Arab tribes claiming an interest in it, and the memorial was unfortunately broken to pieces. The fragments, however, were with great difficulty collected, were rejoined, and are now preserved in the Louvre at Paris. It is an interesting and valuable relic.

MOAN, v. *mōn* [AS. *mœnan*, to moan: Swab. *maunen*, to speak with the mouth nearly shut; *maunzen*, to speak in a whining tone]: to give expression to sorrow or pain in prolonged audible sounds; to lament; to utter moans: N. an audible expression of grief or suffering; a low cry of sorrow. MOAN′ING, imp.: N. the act of one who moans. MOANED, pp. *mōnd.* MOAN′FUL, a. *-fûl*, sorrowful. MOAN′FULLY, ad. *-lĭ.*

MOAT, n. *mōt* [OF. *mothe*, a little earthen fortress; *motte*, a lump of earth, a clod; *mote*, a dike: It. *mota*, a moat about a house: mid. L. *mota*, a hill or mound on which a fort was built]: a ditch or deep trench around a castle or around the ramparts of a fortress, sometimes filled with water: a *dry* moat should have a depth not less than 12 ft., and a width not less than 24. The more perpendicular the walls, so much the greater the obstruction to the enemy. In regular works, the walls are usually revêted with masonry; that at the foot of the rampart being the scarp or escarp, and that below the covered way the counterscarp (see DITCH: FORTIFICATION): V. to surround with a ditch for defense. MOAT′ING, imp.

MOAT'ED, pp.: ADJ. surrounded or fortified by a moat. *Note.*—MOAT meant originally a sod or turf, such as may be dug out, and used to form a mound, and hence in OE., 'an earthen wall to defend a house or place,' and then 'the trench so formed by digging': Bav. *mott*, peat dug for fuel: It. *mota*, mire; *motta*, a heap of earth, also a hollow: Sp. *mota*, a mound—see Skeat.

MOB, n. *mŏb* [L. *mobĭlĕ*, easily moved, variable, as in L. *mobĭlĕ vulgus*, the fickle common people: comp. Gael. *mop* or *mob*, disorder, confusion; *mobainn*, to handle roughly]: a crowd or multitude of people rude and disorderly; a crowd; the populace: V. to attack in a disorderly crowd; to harass or overbear tumultuously. MOB'-BING, imp. MOBBED, pp. *mŏbd.* MOBBISH, a. *mŏb'bĭsh*, done after the manner of a mob. MOB-LAW, a rough and off-hand way of administering justice undertaken by a mob.—SYN. of 'mob, n.': assemblage; assembly; multitude; throng; swarm.

MOB-CAP, n. *mŏb-kăp'* [OE. *mobble*, to muffle up; O. Dut. *moppen*, to wrap up; *mop*, a woman's coif: Low Ger. *mopp*, a woman's cap]: a kind of female undress for the head, having a full round crown gathered into a band at the outer edge, usually made of clear muslin; a woman's night-cap.

MOBERLY, *mō'bĕr-lĭ:* city, Randolph co., Mo.; a railroad and manufacturing centre, 23 m. s. of Macon, 148 m. w. of St. Louis. It has 11 churches, a high school, one daily and two weekly newspapers, and two banks. Its manufactures include flour, tobacco, carriages, and various implements. There is also a planing mill, and a foundry; the shops of the Wabash Western r.r. are here, and there are machine shops for repair work of different kinds. Pop. (1880) 6,070; (1890) 8,215; (1900) 8,012.

MOBILE, a. *mō'bĭl* [F. *mobile*, movable—from L. *mobĭlĕ*, easily moved, variable]: susceptible of motion; movable; fluid. In military affairs, especially in continental Europe, applied to an army in readiness to take the field (see MOBILIZE). MOBILITY, n. *mō-bĭl'ĭ-tĭ*, capacity of being moved; fluidity; fickleness; the lower stratum or mob.

MOBILE, *mō-bēl':* city, cap. of Mobile co., Ala., port of entry, and most important railroad and commercial centre in the state. It is on the M. river, near its union with the M. bay, 30 m. n. of Gulf of Mexico, 140 m. e. of New Orleans, 1,033 m. from Washington. It is about six m. long and extends two to three m. w. from the river, but the closely settled portion occupies only about one sq m bordering on the river. M. is on a sandy plain about 15 ft. higher than the river. Its wide and shaded streets are regularly laid out, lighted with gas and electricity, and many of them are well paved. An abundant supply of pure water is obtained from Spring Hill, five m. away, the works for which cost half a million dollars. S. and w. of the city are hills covered with pines which

are popular resorts in the hot season, and upon which many beautiful summer residences have been erected. With the exception of occasional visits of yellow fever, which sanitary precautions are making less frequent, the location is healthful. M. is an important railroad centre; three trunk lines leading to the great cities of the s. and w., two local lines, and the M., Jackson and Kansas City railroad furnish means of communication. The great coal fields and iron mines in the central part of the state also are reached by railroad, and there are steamer connections with Montgomery, the large seaboard cities and Liverpool. On account of the shallowness of the harbor large vessels were formerly compelled to remain in the bay about 25 m. from the wharves. The national govt. appropriated $250,000 to deepen the channel, and ships drawing 22 or 23 ft. of water are able to enter the harbor. New wharves were built at cost of $240,000. M. is the natural shipping point of the largest cotton-growing section in the Union, and the outlet of 2,000 m. of navigable rivers which drain a rich agricultural, iron, and coal region. In 1902-3 the total exports and imports were valued at $16,790,000. The annual timber shipments, foreign and coastwise, are about 30,000,000 ft., besides 150,000 to 200,000 pieces of white oak for wine barrel staves and 130,000,000 cypress shingles. Of the import trade coffee is the most important item. M. which, after the civil war until about 1880, had a season of depression and decline in population and trade, is now more than renewing its former prosperity. The manufacturing interests are increasing rapidly. They include cotton-mills, foundries, sash and door works, box and barrel shops, paper-mills, shingle mills, etc. Market-gardening is an important interest. M. has numerous churches, 4 orphan asylums, U. S. marine hospital; excellent schools, including a high school for colored children; academies, Jesuit college, state medical college; and 1902, Sept., 6 banks, including 2 national, capital $500,000; 2 state, capital $240,000; 2 private banking concerns, and several fire insurance companies. There are 6 lines of street cars, and several newspapers. Among the fine buildings are the custom-house, in which the post-office is located; Rom. Cath. cathedral, Christ Church (Prot. Episc.), Odd-Fellows' hall, and the Battle House. M. was founded 1702 and was the cap. of La. till 1723, ceded to Great Britain 1763, captured by the Spanish 1780, retaken for La. 1813, and was incorporated a city 1819, with pop. 2,500. It was the scene of important military and naval operations in the civil war. Pop. (1900) 38,469.

MOBILE BAY, Battle of, a battle of the Civil War, fought 1864, Aug. 5. The Union fleet lost 52 killed, 170 wounded, and 113 drowned in the Tecumseh; the Confederates 10 killed, 16 wounded, and 280 prisoners, besides the casualties in the fort. Both forts surrendered. The Union fleet carried 159 guns, and the officers and crews numbered 3,000 men. The Confederate fleet carried 22 guns and 470 officers and men.

MOBILE′ POINT: end of a long narrow sand-strip in s.w. Ala. which separates Mobile Bay from the Gulf of Mexico on the s.: the Point is the e. extremity of the entrance to Mobile Bay, and is the site of Fort Morgan (q.v.). Fort Bowyer, a previous rude construction on the same site, was attacked by a British squadron of four vessels 1814, Sep. Its garrison of 130 men under Maj. Lawrence held the fort with a loss of 8 men: the British loss was 232 killed and wounded, and their flag-ship, which grounded and was burned. 1815, Feb., Fort Bowyer was captured by the British.

MOBILE′ RIVER and BAY: river, and its estuary in s.w. Ala., discharging into the Gulf of Mexico.—The *River* is formed by the confluence of the Alabama and Tombigbee, 50 m. above Mobile, which lies at its mouth. It is a sluggish stream, with low banks and several channels. Six m. below the junction of the two rivers which form it, it divides into an e. branch (the Tensas river) and a w. branch (M. river). The M. is navigable for large steamboats throughout.—The *Bay* is 30 m. n. to s., and 10 or 12 m. e. to w. The entrance from the Gulf of Mexico, 3 m. wide, is defended by Fort Morgan and Fort Gaines.—M. Bay is a shallow sheet of water, 12 to 14 ft. deep. At its s.w. extremity is an outlet communicating with Mississippi Sound through Grant's Pass, giving inland navigation for light-draught steamers through Lake Ponchartrain to New Orleans. A plan for dredging a channel 23 ft. deep through the bay from the city of Mobile to the Gulf is now being carried out. Many small rivers empty into the bay from the n., and its margins are lined with thick groves of live oak and magnolia.

MOBILIER, CRÉDIT, *krā-dē′ mō-bē-lyā′:* notable banking institution in France, sanctioned by the French government 1852, Nov. 18, under the name *Société Général de Crédit Mobilier.* The name was intended as a contrast to the *Sociétés de Crédit Foncier*, which are of the nature of land banks, and advance money on the security of real or *immovable* property; while the *Crédit Mobilier* proposed to give similar aid to the owners of *movable* property. The declared object of this bank is especially to promote industrial enterprises of all kinds, such as the construction of railways, sinking of mines, etc. Various privileges were conferred on it under its charter; in especial, it was allowed to acquire shares in public companies, and to pay the calls made upon it in respect of such shares, by its own notes or obligations; also to sell or give in security all shares thus acquired. The operations of the society were on a very extensive scale. In 1854, it subscribed largely to the govt. loan on account of the Russian war, to the Grand Central Railway Company, to the General Omnibus Company of Paris, and to various other important undertakings. The dividend for that year was 12 per cent. In 1855, it lent two sums to the govt.—one of 250, the other of 375 million francs. Its operations were vast during that

year, and the dividends declared amounted to 40 per cent. The directors had not hitherto availed themselves of their privilege of issuing their own obligations, but this they now resolved on doing. They proposed to issue two kinds—one at short dates; the other at long dates, and redeemable by instalments. The proposed issue was to amount to 240 millions of francs, but the public became alarmed at the prospect of so vast an issue of paper-money, so that, 1856, Mar., the French govt. deemed it necessary to prohibit the carrying out of the proposed scheme. This was a severe blow to the institution. In 1856, its dividends did not exceed 22 per cent.; in 1857, they were only 5 per cent. Several attempts had been made to resuscitate its credit, but failed. In 1875 it was put under a new board of management, who reported its assets at 77,000,000 francs. In 1878, the capital was reduced from 80 millions to 32, and in 1879, raised again to 40 millions. In 1872–79, the highest value reached by the shares was 390 francs (in 1874). The C. M. has undoubtedly been highly useful in the industrial development of France; but its operations have been hazardous, and except for the timely governmental check would probably have been disastrous.

MOBILIER′, CREDIT′ (of America): see CREDIT MOBILIER OF AMERICA.

MOBILIZE, v. *mŏb′il-īz* [F. *mobiliser*, to make movable —from L. *mobĭlis*, easily moved]: to call into active service, said of troops not previously on the war establishment. MOB′ILIZING, imp. MOBILIZED, pp. *mŏb′il-īzd*. MOBILIZATION, n. *mŏb′il-ĭ-zā′shŭn* [F.—L.]: the calling out and putting into a state of readiness for active service in the field troops not previously on the war establishment. The process consists in augmenting regiments from the peace to the war complement, in calling in men on furlough, in organizing the staff of divisions and brigades, constituting the commissariat, medical, artillery, and transport services, and in accumulating provisions and munitions. As the work of mobilizing an army causes enormous expense, it is resorted to only when hostilities appear imminent.

MOBLE, or MOBBLE, v. *mŏb′l* [Dut. *moppen*, to wrap up (see MOB-CAP)]: in *OE.*, to wrap up as in a hood. MOB′LING, imp. MOBLED, pp. *mŏb′ld*.

MOBOCRACY, n. *mŏb-ŏk′rä-sĭ* [Eng. *mob*, and Gr. *kratĕō*, I rule]: the rule or ascendancy of the mob.

MOCCASIN, n. *mŏk′ä-sĭn* [Indian word]: a shoe or cover for the feet made of deerskin, but without a sole; the shoe worn by the American Indians. In the southern United States, an exceedingly poisonous water-serpent, called sometimes Water-moccasin (spelled also *Mocassin*), or Cotton-mouth (*Ancistrodon piscivorus*); about two ft. long; dark brown above, gray below. It frequents swamps and is prompt in attack.

MO'CHA: seaport, former cap. of Yemen, in Arabia; on the Red Sea, at the head of a little bay near the Strait of Bab-el-Mandeb, 130 m. w.n.w. of Aden (q.v.). All round the shore is a hot sandy waste. The principal trade is in coffee; but the eminence of M. as the shipping port for all the coffee of Yemen (M. not being itself in the coffee-growing country), has now been transferred to Aden. Other exports are dates, gums, balm, ivory, and senna. Pop. 5,000.

MOCHA, n. *mō'kă* [from *Mocha*, in Arabia]: a fine description of coffee. MOCHA-STONE, a white translucent variety of agate, containing brown markings resembling finely ramified vegetable filaments or mosses—named from the fact that when they first became known in Europe, they were brought from Mocha. Of the same nature with Mocha-stones are *Moss Agates*. The resemblance of the inclosed infiltrations to plants is often merely accidental, but it appears to be some times really due to plants, which were inclosed in the cavity in which the silicious mineral itself was formed.

MOCK, v. *mŏk* [Ger. *mucken*, to make mouths at one: O. Dut. *mocken*, to mumble: Sp. *mueca*, a grimace: It. *mocca*, a mocking mouth: Gr. *mōkŏs*, mockery: OF. *mocquer;* F. *se moquer*, to mock]: to laugh at; to deride; to mimic in contempt; to subject to unnecessary disappointment; to fool; to tantalize; to make contemptuous sport of: ADJ. assumed; not real; false: N. any act of contempt or derision; a sneer; insult. MOCK'ING, imp.: ADJ. imitating in contempt or ridicule; treating with sneers: N. derision; insult. MOCKED, pp. *mŏkt*. MOCKER, n. *mŏk'ér*, one who mocks; a scoffer; a deceiver. MOCK'ERY, n. *-ér-ĭ*, the act of deriding and exposing to contempt by imitation or mimicry; derision; sportive insult or contempt; false show; imitation; subject of laughter or derision; vain effort. MOCK'INGLY, ad. *-lĭ*. MOCKING-BIRD: see below. MOCK-LEAD or -ORE, a sulphuret of zinc. MOCK-SUN, n. a Parhelion (q.v.). MOCK-TURTLE, a soup in imitation of turtle-soup, made of calf's-head, and often of pig's-head or cow's-head and feet. TO MAKE A MOCK OF, to turn any person or thing into ridicule.—SYN. of 'mock, v.': to ridicule; taunt; laugh at; mimic; sneer at; jeer; gibe; disappoint; in *OE.*, defeat; elude.

MOCKADO, n. *mŏk'a-dō* [from *mock*]: a fabric made in imitation of velvet; mock-velvet, made specially in Queen Elizabeth's time: mockery.

MOCK'ING-BIRD, or MOCK'ING-THRUSH (*Mimus*): genus of birds of family *Merulidæ*, having a more elongated form than the true thrushes, a longer tail, shorter wings, and the upper mandible more curved at the tip. They all are American, forming a group often placed among the Thrushes (*Turdidæ*). The best-known species, the M. of the United States (*M. polyglottus*), is about the size of the song-thrush; the upper parts of a dark brownish ash color, the wings and tail nearly black, the under

parts brownish white. The M. is common in almost all parts of America, from the south of New England to Brazil; n. of the Delaware, it is only a summer visitant, but in more southern regions it is found at all seasons. It is one of the most common birds of the W. Indies, and its exquisite song fills their groves with melody by night, for which reason it is there very generally known as the Nightingale. By day, the M. is generally imitative, excelling all birds in its power of imitation, taking up the song now of one bird, now of another, and often deceiving the most practiced ear by its perfect performance. By night, its song is usually natural. It does not confine itself to musical strains; it seems to take equal pleasure in repeating

Mocking-bird (*Mimus polyglottus*).

the harshest cries of the feathered tribes; and in domestication readily adds to its accomplishments the imitation of almost any sound which it is accustomed to hear, passing from one to another with great rapidity, so as to produce an incomparable medley. The M. readily learns to whistle a tune, even of considerable length, but there is no well-authenticated instance of its imitating the human voice. The barking of a dog, the mewing of a cat, the crowing of a cock, the cackling of a hen, the creaking of a wheelbarrow, all are within the compass of its powers. During its performances, it spreads its wings, expands its tail, and throws itself about, as if full of enthusiasm and enjoyment. The M. is vocal at all seasons of the year. Two or three broods are produced in a year. The male is extremely attentive to his mate, and manifests extraordinary courage in driving away enemies from the nest. Mocking-birds often assemble on such occasions, and birds of prey, far superior to them in size and strength, are compelled to retreat. Snakes are killed by reiterated blows on the head, and cats learn to consider the vicinity of a mocking-bird's nest unsafe. The food of the M. consists chiefly of berries and insects. Another species of M. is found in the Rocky Mountains, and species of the same genus are among the finest song-birds of the temperate parts of S. America.

MOCO, n. *mō′kō:* a S. Amer. animal, allied to the guinea-pig, but larger.

MODAL, a. *mō′dăl* [It. and F. *modale*—from L. *modus*, measure, method: Sp. *modal*, modal]: relating to form or mode; having the form without the essence or reality. MO′DALIST, n. *-ĭst*, in *theol.*, one who views the Father, Son, and Holy Spirit as modes of being, and not as having distinct personality. MO′DALLY, ad. *-lĭ.* MODALITY, n. *mō-dăl′ĭ-tĭ* [F. *modalité*]: the quality of being in form only; in *logic*, a term employed to designate propositions in which the copula is accompanied by some phrase which adds to or restricts its meaning. MO′DAL-PROPOSI′-TION, in *logic*, a proposition which affirms or denies with a qualification or limitation.

MODE, n. *mōd* [F. *mode*—from L. *modus*, measure, manner, method: It. *modo;* Gael. *modh*, manner, method: Icel. *mot*, type]: manner of existing or being; in *metaph.*, that which cannot subsist in and of itself; manner; fashion; custom; usual way or course; in *music*, the peculiar melody of the octave in its divisions, as the minor *mode*, the major *mode.* THE MODE, the prevailing fashion or custom.—SYN.: accident; gradation; degree; manner; method; form; state.

MODE, in Music: the peculiar melody of the octave in its divisions. Every musical passage is referrible to and forms part of a succession of sounds having some appreciable relation to one another. This succession of sounds is called the scale, and is a series of steps leading from a given note called the Key-note, or Tonic (q.v.), to its octave. The steps or degrees of the scale are of unequal size, and on the place of the smaller ones or semitones depends the *mode* of the music. Taking our

Major Mode. Minor Mode.

natural scale, there are only two notes in it which can satisfy the ear as key-notes—viz., C and A. In the major mode, with C as key-note, the semitone or small interval falls between the third and fourth sounds; in the minor mode, with A as key-note, it falls between the second and third sounds; in the former case, the third of the key-note is a major third, in the latter a minor third. The minor mode further requires to be modified by occasionally sharpening its sixth and seventh, in order to be pleasing to modern ears. The scale of the major mode is derived from simpler harmonic proportions than that of the minor. Melodies composed in the latter mode have generally more or less of a plaintive or melancholy character. For the theory of these modes, see MUSIC. Ancient musicians admitted of a greater variety of modes. The Greeks had six, designated the Dorian, Phrygian,

Lydian, Mixo-Lydian, Ionic, and Æolian. The Ionic is the modern major, the Æolian the minor mode; the others are more or less intolerable to a modern ear. They are used to a limited extent in the music of the Greek Church, and in the Ambrosian Chant.—Mode is used more rarely to signify *key*.

MODEL, n. *mŏd'ĕl* [OF. *modelle;* F. *modèle*—from It. *modello*, a model, a frame—from L. *modŭlus*, a size or measure of a small thing—from L. *modus*, a measure]: a pattern of something to be made; a pattern in miniature; any object which an artist proposes to imitate; a copy or object for imitation; a mold; a copy or representation; that by which anything is measured or formed: V. to shape; to make a pattern or copy of in some plastic substance. MOD'ELLING, imp.: N. the art of constructing representations of things in clay or other plastic materials, as a pattern for a work of art, or as a mold for reproductions. MOD'ELLED, pp. *-ĕld:* ADJ. shaped; formed. MOD'ELLER, n. *-ĕr*, one who practices modelling; a molder or designer in clay, plaster, or wax.

MOD'ELLING: art and process of preparing the original pattern or design from which a work in sculpture is to be cast or carved: for the technical details, see SCULPTURE. M. is practiced by medallists also; the head or figure intended to be cut in the die being first modelled in relief with wax on a piece of slate. Goldsmiths, silversmiths, and jewellers also model intricate and artistic forms and ornaments of pieces of plate, to be cast and chased by them, or in which jewels are to be set. Wax is the substance used when delicacy and minuteness are required. M. is a branch of the potter's trade also. Flaxman modelled for Wedgwood numerous figures and groups in wax. For large models, the material employed is potter's clay, which, when used by sculptors, is mixed with a portion of sandstone, finely pulverized, to make it work freely.

MODENA, *mŏd'ā-nâ* or *mŏd'ĕn-â:* modern province of Italy, comprising part of the anc. duchy of M. which lay between the Po and the Mediterranean. The duchy shared the various vicissitudes which befell Italy, and participated in the great internecine feuds of the country. In 960, a member of the great House of Este was proclaimed Marquis of M.; and 1452 the then reigning marquis was created duke by Emperor Frederick III. In 1796, M. formed part of the Cisalpine Republic, but was restored 1814 by the Congress of Vienna to the reigning family. The duchy had at that time 2,310 sq. m.; pop. 586,000. In 1048, the Duke of M. was temporarily deprived of his rights; and 1860, the people definitively expelled their unpopular ruler, who carried off all the property and valuables within his reach, including the silver handles of the palace doors. The present province of M. has 960 sq. m.; pop. (1881) 279,405; (1889) 303,541; (1901) 315,804.

MO'DENA (anc. *Mutina*): fortified city of n. Itaĭy, cap. of the former duchy of M.; 24 m. w.n.w. of Bologna. It stands between the rivers Secchia and Panaro, in a pleasant plain, noted for rich soil and salubrious air, and from its surrounding ramparts commands fine views of the Apennines. Although the social life of M. is somewhat stagnant, it is nevertheless an agreeable city. It lies on the famous Via Æmilia (see EMILIAN PROVINCES), by which it is divided into the old and new city, and is connected by a navigable canal with the rivers Secchia and Panaro. Among public buildings, may be noted the cathedral of St. Geminianus, patron of the city, a structure of the purely Lombard style. The campanile or belfry is one of the great towers of Italy; it is a square turreted structure, 315 ft. in height, its entire façade being in white marble. The ducal palace, a picturesque structure of the 17th c., is adorned with innumerable galleries, courts, and marble arches; it contains the splendid Biblioteca Estense, numbering 100,000 vols., and 3,000 rare MSS.; also the valuable Este archives, a most important collection of mediæval records, collections of coins and medals of great antiquity, and an observatory. Schools of theology, law, medicine, and mathematics have replaced the university, suppressed 1821; there are also fine museums of nat. history, a botanic garden, theatres, and good public baths. The trade of M. is unimportant: the manufactured products are confined to linen and woolen fabrics, leather, hats, paper, glass, and pottery, besides silk manufactured to a much less extent than formerly.—The ancient history of M. evidences its prosperity at an early period; the splendor, wealth, and arts of the city being mentioned by Cicero, Pliny, and Strabo.—Pop. commune (1901) 64,843.

MODERATE, a. *mŏd'ĕr-āt* [L. *modĕrātus*, kept within limits or bounds, temperate—from *modus*, measure, mean: It. *moderato;* F. *modéré*, moderate]: temperate; observing reasonable bounds, as in the indulgence of the appetites, in expressing opinions, etc.; not excessive, as in price or value; not extreme, as in opinions; not great; medium: V. to restrain from excess of any kind; to regulate; to reduce or lessen in violence or intensity; to allay; to pacify; to become less violent or intense. MOD'ERATING, imp. MOD'ERATED, pp. MOD'ERATELY, ad. *-lĭ.* MOD'ERATENESS, n. *-nĕs*, state of being moderate; a mean or middle state. MOD'ERATES, n. plu. *-āts*, in *Scot. eccles. hist.*, the Broad Church party in the Kirk of Scotland, who inculcated a wide toleration in ecclesiastical matters, as distinguished from the Evangelical party, who inculcated a narrow and literal adherence to the Kirk's standards. MOD'ERATOR, n. *-ā-tér*, a president or chairman; in *Presb. churches*, the chairman of any church court; in some other denominations, the chairman of various councils and conferences; that which regulates. MOD'ERA'TORSHIP, n. *-shĭp*, the office of a moderator. MOD'ERA'TION, n. *-ā'shŭn* [F.—L.]: state of

be.ng moderate; restraint in indulgence; temperance; calmness of mind; equanimity; forbearance. MODERA'TIONS, n. plu. a certain examination of students at Oxford. MOD'ERA'TO, ad. *-ā'tō* [It.]: in *music*, denoting a movement between andante and allegro; moderately. TO MODERATE IN A CALL, among *Scot. Presbyterians*, to take the proper ecclesiastical legal steps on the part of a presbytery to induct a minister into a church, in order to give effect to the formally expressed wishes of the congregation.—SYN. of 'moderate, v.': to regulate; mitigate; qualify; temper; appease; pacify; quiet; abate; lessen; allay; repress; still; restrain.

MODERN, a. *mŏd'ĕrn* [F. *moderne*, modern—from mid. L. *modernus*, of the present mode or fashion, modern—from L. *modo*, just now, of late: It. and Sp. *moderno*, late, recent]: pertaining to the present, or time not long past; late; recent; not ancient: N. one of modern times, as opposed to one of ancient times, used in plu. MOD'ERNNESS, n. *-nĕs*, the state of being modern. MOD'ERNIZE, v. *-īz*, to render modern; to give a modern form to. MOD'ERNIZING, imp. MOD'ERNIZED, pp. *-īzd*, rendered suitable for modern usage or style. MOD'ERNIZER, n. *-ī-zĕr*, one who renders modern. MOD'ERNIZA'TION, n. *-ī-zā'shŭn*, the rendering conformable to modern usage that which is ancient or antiquated. MOD'ERNISM, n. *-īzm*, modern practice; something recently formed, as in language; something whose origin is not remote. MOD'ERNIST, n. *-ĭst*, an admirer of the moderns. MODERN EPOCH, in *geol.*, the existing period, embracing all formations which owe their origin to causes now in action.—SYN. of 'modern, a.': new; novel; present; fresh; common.

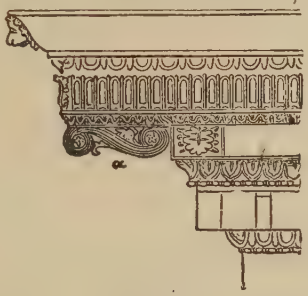
MODEST, a. *mŏd'ĕst* [F. *modeste*—from L. *modestus*, that keeps within due bounds—from *modus*, measure, limit: It. *modesto*]: restrained by a due sense of propriety; not forward or bold; unobtrusive; diffident; becoming; not excessive; reasonable; not lewd; chaste. MOD'ESTLY, ad. *-lĭ*. MOD'ESTY, n. *-ĕs-tĭ* [F. *modestie*—from L. *modestĭă*]: the lowly estimation of one's own merits, importance, or powers; unassuming conduct; propriety of manner or behavior; decency; decorum; chastity.—SYN. of 'modest': bashful; reserved; decent; shy; coy; virtuous; moderate; humble.

MODICA, *mŏd'ē-kâ* (*Mohac* of the Saracens): city of the island of Sicily, province of Val di Nota, 30 m. from Syracuse. The city, perched amid rocks, contains several fine buildings, and, notwithstanding the humidity of the climate, the sanitary condition seems satisfactory. The soil of the surrounding district is the most productive of Sicily, and yields vast quantities of corn, tobacco, oil, wine, hemp, which, with cheese, wool, soda, and butter, form the chief export trade of the place. The valley of Ipsica, or Ispica, in the vicinity of M., contains remarkable rocks, in which numerous dwellings are excavated.—Pop. of M. (1881) 37,919.

MODICUM, n. *mŏd'ĭ-kŭm* [L. *modĭcus*, small, not large—from *modus*, measure]: a little; a small quantity.

MODIFY, v. *mŏd'ĭ-fī* [F. *modifier*—from L. *modificārĕ*, to measure, to restrict, to modify—from *modus*, measure, limit; *fĭō*, I become: It. *modificare*]: to change slightly, as in the form or in the external qualities of a thing; to reshape; to vary; to moderate; to lower, as sound. MOD'IFYING, imp.: ADJ. changing the form or external qualities: N. the act of slightly changing. MOD'IFIED, pp. *-fīd:* ADJ. slightly changed; qualified in certain parts. MOD'IFIER, n. *-fī-ĕr*, one who or that which modifies. MOD'IFI'ABLE, a. *-fī'ă-bl*, that may be slightly changed or altered in external appearance or in qualities. MOD'IFI'ABIL'ITY, n. *-fī'ă-bĭl'ĭ-tĭ*, capability of being modified. MODIFICATION, n. *mŏd'ĭ-fĭ-kā'shŭn* [F.—L.]: the act of modifying; a slight change in form; any particular form or manner.

MODILLION, n. *mō-dĭl'yŭn* [F. *modillon*—from L. *modŭlus*, a measure]: in *arch.*, ornamental bracket (*a* in fig.), much used in classic architecture, especially at



Modillion.

regular intervals under the cornices of Corinthian and Composite entablatures.

MODIOLA, n. *mō-dī'ŏ-lă* [L. *modĭŏlus*, a small corn-measure—from *modĭŭs*, a Roman dry measure, a peck]: a genus of bivalves, living and fossil, distinguished from the mussels by their habit of burrowing or spinning a nest, so called in reference to the shape of the shell, which is oblong and inflated in front.

MODIOLUS, n. *mō-dī'ŏ-lŭs* [L. *mŏdĭŏlus*, the nave of a wheel—from *modĭŭs*, a measure]: in *anat.*, the central axis or pillar of the internal ear, conical in form, and extending from the base to the apex of the cochlea.

MODISH, a. *mō'dĭsh* [F. *mode*, manner—from L. *modus*, a measure, manner (see MODE)]: according to the mode or customary manner; in the mode; fashionable. MO'DISHLY, ad. *-lĭ*. MO'DISHNESS, n. *-nĕs*, state or quality of being modish or fashionable. MODIST, n. *mō'dĭst*, a follower of the fashion. MODISTE, n. *mō-dēst'* [F.]: a woman who deals in articles of fashion, particularly in dress; a woman who makes ladies' dresses in the style and mode of fashion: a dressmaker.

MODJESKA, *mōd-jĕs'ka*, HELENA: actress: b. 1844, Oct. 12, Cracow, Poland. Her father, Michael Opido, a noted musician, educated her in literature and art, but her taste for the stage was repressed until her marriage, 1860, to G. S. Modrzejewski (altered in England to Modjeska). Her first amateur acting, at Bochnia, Aust. Poland, 1861, led her husband to form a company, with which she played in the towns of Gallicia; and at Lemberg for three months, 1862. She had a theatre of her own in Czernowice; and, 1865, became leading lady in the Cracow theatre, and attained wide fame. Her attachment to the Polish stage caused her to refuse flattering offers elsewhere. After her husband's death, and her second marriage, to Charles Bozenta Chlapowski, 1868, Sep., she settled, 1869, in Warsaw, and during seven years there acted in plays of Shakespeare, Goethe, Schiller, and Molière. Removal to California, near Los Angeles, 1876, led to her studying English 1877, and entering on a period of remarkable success in Amer. and England. Madame Bozenta's husband is an Amer. citizen by naturalization.

MODOCS, *mō'doks:* tribe of Amer. Indians, originally located on a district, of abt. 4,000 sq. m., s. of Lake Klamath, Cal. In origin they were of the Klamath nation, which was seated, in three tribes, in n.w. California and over the Oregon line, along the Klamath river, from its mouth at the Pacific to its springs near the s. end of Lake Klamath. The Euroc, or down, tribe, dwelt next the Pacific; and on the upper river the Cahroc tribe. Beyond these were the Moadocs or Modocs, the name meaning 'head of the river.' As an outlying and inferior tribe, they became hostile to the Klamaths below them, and waged war with them and with the Shasteecas, trading in slave captives. Though decently clad in skins, and having for houses pits roofed with slabs and a covering of earth, they were most inferior to the Cahrocs, having heavy drowsy faces and dull yellowish eyes, with very dark skin. The whites had experience of their savage character in 1847, 49, and 50. In the last case Capt. Nathaniel Lyon chastized them at Clear Lake, and after the next trouble, a massacre of whites, 1852, Ben Wright invited them to a feast, 1855, and slaughtered 41 of the 46 who came; an act of revenge by treachery which the tribe never forgave. Gen. Crosby's campaign 1856 destroyed many of them, but the war went on to 1864, Oct. 15, when a treaty was made, under which the Modocs and Klamaths ceded all their lands except a mountainous reservation of 1,200 sq. m. on Klamath Lake. This was Klamath territory, and putting Modocs on it made trouble and led to the Modoc war. Capt. Jack (Krentpoos) led off a wild band to an old home of the M. on Lost river, where their operations raised such complaint as to bring out an order for their forcible return to the reservation. A force from Fort Klamath attacked Capt. Jack's camp with loss 1872, Nov. 29; and an Oregon force had the

same experience with another camp across the Klamath river. The two camps retreated together, massacring whites on the way, and found a natural fortress in the lava beds s. of Lake Clear. Major General Wheaton advanced on them, 1873, but was checked 3 m. from their stronghold, with 12 men killed and 21 wounded. A second attempt by General Gillem was no more successful. A third by the government commissioners resulted, 1873, Apr. 11, in the treacherous killing of General Canby and Dr. Thomas, two of the commissioners, and the wounding of a third, Mr. Meacham. June 1 the stubborn resistance of the savages ended with their surrender to Gen. J. C. Davis. Captain Jack, and three others, were tried and hung, Oct. 3, and the band of 148 sent to the Indian Territory.

MODULATE, v. *mŏd'ū-lāt* [L. *modŭlātŭs,* brought within the rules of rhythm or harmony, musical—from *modus,* measure: It. *modulare:* F. *moduler*]: *generally,* to proportion parts to each other; to vary the voice or musical sounds in a natural and pleasing manner; to vary or inflect the pitch of the voice, in reading or speaking, in a pleasing manner; in *music,* to change the key or mode. MOD'ULATING, imp. MOD'ULATED, pp.: ADJ. varied; inflected; formed to a certain key. MOD'ULATOR, n. *-lā-tĕr,* that which modulates. MOD'ULA'TION, n. *-lā'shŭn* [F.—L.]: the act of varying or inflecting the pitch of the voice in speaking or reading, in a pleasing manner; that which is modulated. In *music,* the act of conducting the air and the harmony through the requisite keys and modes in a manner agreeable to the ear; the change from a major into the relative minor key, or *vice versâ.* When in the course of a melody the key-note is changed, and the original scale altered by the introduction of a new sharp or flat, such change is called modulation. Much of the pleasure of music is derived from a judicious use of modulation. The art of good modulation from one key to another consists in the proper choice of intermediate chords. Sudden transitions, without intermediate chords, should be employed only sparingly and in peculiar circumstances. Every piece of music is composed in a particular key, in which it begins and ends, which generally predominates over any other keys introduced in the course of the composition.

MODULE, n. *mŏd'ūl* [F. *module,* measure—from L. *mŏdŭlŭs,* a small measure—from *modus,* measure]: in *classic arch.,* arbitrary measure or standard taken to regulate the proportions of columns or the symmetry of the whole building. The diameter, semi-diameter, or one-third of the diameter of the base of the shaft of a column are most frequently used; the first being usually divided into 60 parts (or minutes), the second into 30 parts, the third into 20 parts.

MODULUS, n. *mŏd'ū-lŭs* [L. *mŏdŭlŭs,* a small measure

—from *modus*, measure]: in mathematics and mechanics, the constant by which quantities of one system must be multiplied to obtain the corresponding quantities of a related system; the constant of adjustment, or factor of proportionality. Thus, within limits friction is proportional to pressure and the stretching of an elastic bar is proportional to the applied force. Thus we have the modulus of friction (q.v.) and the modulus of elasticity (q.v.). The modulus of a system of logarithms (q.v.) is the multiplier by which its logarithms are obtained from those of some standard system. If a is the base of the former and b that of the latter system, the modulus is log. ab. Thus natural logarithms, i.e., logarithms to the base $e = 2.71828+$ may be obtained by multiplying common logarithms (base 10) by log. e $10 = 2.302585+$. Passing from the base e to the base 10, the multiplier is the reciprocal of the last number, viz., 0.4342944+.

MODUS, n. *mō'dŭs* [L. *modus*, a measure]: mode or manner: in *English law*, a compensation given in lieu of tithes. MODUS OPERANDI, *ŏp'ĕr-ăn'dī* [L. *operandum*, working—from *opus*, work]: the method of working; manner of operating; the way in which a thing is to be done.

MOELLER, *mĕl'lĕr*, HENRY, D.D.: American Roman Catholic prelate: b. Cincinnati, Ohio, 1849, Dec. 11. His elementary studies were pursued at St. Joseph's parochial school and he afterwards attended St. Xavier's College. In 1869 he went to the American College, Rome, where he followed a seven years' course in philosophy and theology. He was ordained priest in the Church of St. John Lateran, Rome, 1876, June 10, and after his return to Cincinnati was made pastor of Bellefontaine and later appointed to a professorship in Mount St. Mary's Seminary, remaining there till 1879. In 1880 Archbishop Elder named him chancellor of the diocese of Cincinnati, and on Aug. 25, 1900, he was consecrated bishop of Columbus, Ohio. In 1903, Apr., the Holy See appointed him coadjutor archbishop of Cincinnati with right of succession, and on the death of Archbishop Elder, 1904, Oct. 31, he assumed charge of the archdiocese, the pallium being conferred upon him 1905, Feb. 15.

MOELLER, LOUIS: American genre painter: b. New York 1855, Aug. 5. He worked with his father, a decorator, for four years; studied in Munich with Diez and Duveneck; and in 1883 returned to New York. He became a member of the National Academy in 1895, and has exhibited there since 1883. Among his works are: *Morning News, Puzzled, Short Measure, An Interior*, etc.

MÖEN, *mö'ĕn:* Danish island in the Baltic Sea, separated from Seeland on the n.w. by the *Ulfsund*, and from Falster on the s.w. by the *Grönsund*. It is 19 m. long, by about 5 m. in average breadth; 84 sq.m. The people are supported by agriculture, fisheries, and commerce. Pop. of island, about 15,000.

MŒRIS, LAKE, *mē′rĭs:* ancient name of a sheet of water in Egypt, now known as *Birket-el-Kerûn* or *El-Korn* ('Lake of the Promontory'); in the province of Fayûm, about 50 m. s.w. of Cairo; extreme length n.e. to s.w., 30 m.; breadth, 6 m.: it was formerly much larger. Its average depth is 12 ft., and its greatest ascertained depth 28 ft. On the n. and w., its shores are rocky, but on the s., flat and sandy. It is connected with the Nile by a canal, *Bahr-Jusuf* ('River of Joseph'). The waters are brackish, being impregnated with the alkaline salts of the desert and with the muriate-of-lime depositions of the surrounding hills. In the time of the Pharaohs, the revenue from the fisheries was applied to the maintenance of the queen's wardrobe and perfumes. Under the Persians, the fisheries were let (during the season of the inundations, at a sum equivalent to $750 a day. At present they yield but little more than $400 a year.

MŒSIA, *mē′shĭ-a:* ancient Roman province, bounded by the Danube on the n., the Black Sea on the e., the mountain-chains of *Hæmus* (Balkan) and *Orbelus* on the s., that of *Scardus* and the rivers *Drinus* (Drina) and *Savus* (Save) on the w. The river *Ciabrus* (Cibriz) divided it into two parts, of which the Eastern (*Mœsia Inferior*) is the present Bulgaria, and the Western (*Mœsia Superior*) is Servja. Its original inhabitants were mostly of Thracian race. Gaulish or Celtic invaders settled in W. Mœsia about B.C. 277, under the name of *Scordisci.* The Romans came in contact with the tribes of M. first after the conquest of Macedonia, when C. Scribonius Curio forced his way as far n. as the Danube, and gained a victory over the Mœsians (B.C. 75); but the country was not completely subjugated till B.C. 29. It was made a Roman province in the reign of Augustus, prob. abt. B.C. 16, and flourished for more than two centuries; but as a frontier province it was exposed to hostile invasions, and required a line of fortresses and stations all along the s. bank of the Danube. In A.D. 250, the Goths made an irruption into the country, and defeated and slew the Roman emperor, Decius. At last, about the end of the 4th c., M. was given up to them (known afterward as Mœso-Goths) by Emperor Theodosius I. Slavonian tribes settled in M. in the 6th and 7th centuries.

MŒSO-GOTHS, n. *mē′zō-gŏths* [from Mœsia—q.v.]: later name of the Goths who in the 3d c. settled in Lower Mœsia, at the mouth of the Danube. Ulfilas (q.v.) was a Mœso-Goth. The name, however, became of more general use to designate those who remained in Mœsia after the great migration in the beginning of the 5th century. MŒSO-GOTHIC, n. language of the Mœso-Goths: TEDJ. of or pertaining to. MŒSO-GOTHIC GOSPELS: see ULFILAS.

MOFFAT, *mŏf′at:* market-town and favorite watering-place of Scotland, county of Dumfries; in the upper part of the broad and beautiful valley of the Annan, surrounded by hills of moderate elevation, 19 m. n.n.e. of Dumfries. A short railway to connect M. with the main

Caledonian line was opened 1883. Among the public edifices are the baths and the reading and assembly rooms. The mineral springs, the principal of which, like that of Harrogate, is saline and sulphurous, are quite famous; but perhaps the greatest attractions of the place are its salubrious air and exquisite environs. Northward are the Moffat Hills; highest summit, Hartfell, 2,650 ft. During the season, the town is increased in population by from 800 to 1,000 visitors, to suit whose convenience great numbers of elegant villas, commanding fine views of the neighboring country, have been erected.—See Black's *Guide to M.*—Pop. (1881) 2,161; (1891) 2,290.

MOF'FAT, ROBERT, D.D.: Christian missionary: 1795, Dec. 21—1883, Aug. 9; b. Ormiston, East Lothian, Scotland; of humble parentage. Having resolved to become a missionary to the heathen, he offered his services 1814 to the London Missionary Soc. (see MISSIONS, CHRISTIAN), and was sent by them 1816 to s. Africa. Arriving at Cape Town 1817, he immediately proceeded beyond the boundaries of Cape Colony to Namaqualand, where he entered on his labors at the kraal of Africaner, a powerful chief whose name had long been a terror to the people of the neighboring districts of the colony, for his audacious raids among their settlements, and for his ferocious character, but who, under M.'s influence, became a convert to Christianity. Here M.'s efforts had great success, Christianity and civilization advancing together. But the situation, on account of the drought and sterility of the country, and its very thinly scattered population, was unsuitable for a principal and permanent mission-station. M. returned to Cape Town 1819, where he married an excellent and heroic woman, to whom he had become engaged in England—his untiring helper for 50 years; and 1820 they went to Griqua Town, and ultimately to Kuruman, among the Bechuanas, w. of the Vaal river. Here he labored devotedly till the infirmities of age compelled his return to his native country 1870. He had an intermission of a few years in Britain, ending 1842. Wherever he went, the gospel was gladly received by some of those who heard it, and in some places by many. Alone, he translated the whole Bible into Bechuana—creating a written language. In every place he guided the people also in the arts of civilized life. He made frequent and extended missionary tours, in which his adventures were very remarkable, and are graphically described in his work, *Missionary Labors and Scenes in Southern Africa* (Lond. 1842). His daughter became the wife of the African missionary explorer, Dr. Livingstone, who was largely influenced by M. in choosing his life-work. In 1873, he was presented with a testimonial of £5,800 in recognition of his great services in Christianizing and civilizing the savage tribes from Kuruman almost to the Zambesi. He lectured on African missions in Westminster Abbey 1875; and 1881 the Lord Mayor of London held a banquet in his honor. He died at Leigh, near Tunbridge Wells.

MOFUSSIL, *mō-fŭs′sĭl* [from Arabic word meaning 'separate']: term commonly used by Anglo-Indians for the rural part of a district as opposed to the administrative headquarters. Thus in Bengal the M. means practically the whole province beyond the city of Calcutta.

MOGADOR, *mŏg-a-dōr′*, or SUEIRA, or SUERAH, *swē′râ:* fortified town and seaport, cap. of the province of Haha; 130 m. w.s.w. of the city of Morocco. It stands on a rocky promontory, opposite a small island which forms the harbor, and is said to be the best-built town in the kingdom of Morocco. Though the harbor has a sheltered appearance, it is very dangerous in w. and s.w. winds. The streets are regular, though narrow; and the town consists of two parts, each surrounded by water. The quarter called the Fortress contains the custom-house and the treasury, and is the residence of the pasha, the vice-consuls, and the Christian merchants. The town is defended by four batteries on the island, and by a fort on the land-side; the walls also are defensible. M. is the seat of considerable trade; it exports olive-oil, wool, gum, hides, feathers, gold-dust, and almonds. Commerce is mainly in the hands of the Jews. The chief imports are woolens, cottons, and hardware. The total imports have annual value between $1,000,000 and $1,500,000; exports have about the same value. The climate is remarkably equable. Pop. about 20,000.

MOGAR, n. [native W. Indian]: the dried stick of the sugar-cane.

MOGRABIAN, a. *mō-grā′bĭ-an* [Ar. and Turk. *moghreb*, the west, n.w. Africa]: of or pertaining to north or northwest Africa: N. a native or inhabitant of north or northwest Africa.

MOGUER, *mō-gär′* [Ar. 'caves,' of which there are many in the neighborhood]: town of Spain, province of Huelva, 43 m. w.s.w. of Seville, rising gently above the Rio Tinto, near the mouth of which is its port, Palos. The streets are generally broad and straight, but both the town and castle are dilapidated. The old Franciscan convent was ordered 1846 to be preserved as a national memorial, but it is now fast going to ruin, and the wood of the cells stripped off. Here, 1484, Columbus, craving charity, was received by the prior, Juan Perez de Marchena, by whose influence he was enabled to prosecute his discoveries, setting out from the port of Palos 1492, Aug. 3. To this port also he returned 1493, Mar. 15, after having accomplished the great end of his expedition. Here likewise did Cortes land 1528, May, after the conquest of Mexico, and lodged in the same convent which gave shelter to Columbus. Palos is now a poor decayed fishing-port. M. has some trade in wine and fruit. Pop. abt. 8,350.

MOGUL, n. *mō-gŭl′*, or GREAT MOGUL [Pers. and Ar. *mughal*, a native of Tartary]: popular designation of the emperor of Delhi, as the impersonation of the powerful empire established in Hindustan by the Monguls (q.v.), who were called *Moguls* by the Persians. The first Great Mogul was Baber, great-grandson of Timûr, who founded the Mongul empire in Hindustan 1526. In 1803, the Great Mogul was deprived of his throne; 1827 he lost even the appearance of authority, becoming a mere pensioner of the British; and 1858 Mohammed Bahadûr, last of the dynasty, was transported for complicity in the Indian mutiny. (The true spelling is *Mughal.*)

MOGUNTINE, a. *mō-gŭn′tĭn* [L. *Moguntia*, *Moguntiacum*, ancient name of the town]: of or pertaining to Mainz, in Germany.

MOHACS, *mō-hâtch′:* market-town of Hungary, 110 m. s.s.w. of Pesth, on the w. arm of the Danube. It contains a gymnasium, has an important cattle-market, is a station for steam-boats on the Danube, and the seat of considerable trade in wine, coal, timber, and agricultural produce. Pop. (1890) 14,403. It owes its historical importance to the great battle here, 1526, Aug. 29, between Lewis II. of Hungary, with 25,000 Hungarians, and the Sultan Soliman, at the head of about 200,000 Turks. The battle resulted in the disastrous defeat of the Hungarians, who lost their king, 7 bishops, many nobles and dignitaries, and more than 22,000 men. A second battle was fought here, 1687, Aug. 12, when the Turks in their turn were defeated by an Austro-Hungarian army under Charles of Lorraine. These two battles mark the beginning and end of Turkish dominion in Hungary.

MOHAIR, n. *mō′hâr* [said to be from Ar. *mokhayyar*, a kind of hair-cloth: Ger. *mohr;* F. *moire;* OF. *mouäire*]: a sort of camlet; the fine, soft, silky, long, pure white wool or hair of the Angora goat, native of Asia Minor; also the cloth made of its wool. Each animal yields 2 to 4 lbs. of wool at the annual clip, Apr. or May; and the exportation in recent years has grown very large: see GOAT: ANGORA: WOOLEN MANUFACTURE.—The Angora goat has not been acclimatized in Europe; but in 1849, and at various times since, flocks have been introduced into the United States—Va. and other southern states, and Or., Cal., and some other western states. In these high regions, with dry air, the flocks thrive and are now numerous.—M. is also a general term for cloth made of hair: spelled also MOIRE, which see.

MOHAMMED, n. *mō-hăm′ĕd* [Ar. *muhammad*, praiseworthy—from *hamd*, praise]: founder of the Mohammedan religion (see below). MOHAMMEDAN, a. *mō-hăm′ĕ-dăn*, of or relating to Mohammed or to his religion: N. a believer in Mohammed. MOHAM′MEDANIZE, v. *-īz*, to convert or make conformable to the religion of Mohammed. MOHAM′MEDANISM, n. *-ĭzm*, the system of religion founded by Mohammed, the principles of which are contained in the *Koran:* see below.

MOHAMMED, *mo-hăm'ĕd* (Arab. *the Praised**): founder of Islam: about 570–632, June 8; b. at Mecca, Arabia; son of Abdallâh, of the family of the Hâshim; and of Amina, of the family of Zuhra, both of the powerful tribe of the Koreish, but of a side-branch only, and therefore of little influence. His father, a poor merchant, died either before or shortly after M.'s birth, whom his mother then (according to a doubtful tradition) is supposed to have handed over, after the fashion of her tribe, to a Bedouin woman, that she might nurse him in the salubrious air of the desert. In consequence of the repeated fits of the child, however, which were ascribed to demons, the nurse sent him back in his third year. When he was six years old, his mother died; his grandfather, Abd-Al-Mutallib, adopted the boy; and when, two years later, he too died, M.'s uncle, Abu Talib, though poor himself, took him into his house, and remained his best friend and protector throughout his life. The accounts which have survived of the time of his youth are too legendary to deserve credit; certain, however, it seems to be that he at first gained a scanty livelihood by tending the flocks of the Meccans, and that he once or twice accompanied his uncle on his journeys to s. Arabia and Syria. In his 25th year, he entered the service of a rich widow, Chadîdja, likewise descended from the Koreish; and accompanied her caravans—in an inferior capacity, perhaps as a camel-driver—to the fairs. Till that time, his circumstances were very poor. Suddenly his fortune changed. The wealthy, but much older, and twice widowed Chadîdja offered him her hand, which he accepted. She bore him a son, Al-Kâsim—whence M. adopted the name Abu Al-Kâsim—and four daughters: Zainab, Rukaija, Umm Kulthûm, and Fâtima; and afterward a second son, whom he called Abd Manâf, after an idol worshipped among his tribe. Both his sons, however, died early. M. continued his merchant's trade at Mecca, but without much energy, spending most of his time in solitary contemplations. In his 35th year, he is said to have, by chance only, been chosen arbiter in a quarrel about the replacing of the sacred black stone in the Kaaba (q.v.); but not before his 40th year is there anything really important to be told of his life.

Before entering on the weighty events of the subsequent period, it is well to advert to such traits of M.'s outward appearance as are yet recoverable. He was of middle height, rather lean, but broad shouldered, and altogether of strong build; slightly curled black hair flowed round his strongly developed head; his eyes, overhung with thick eyelashes, were large and coal-black; his nose, large and slightly bent, was well formed. A long beard added to the dignity of his appearance. A black mole between his shoulders became afterward among the faithful 'the seal of prophecy.' In his walk,

* M. is spelled also *Muhammad*, *Mohammad*, *Muhaumad*, and (less correctly) *Mahommed*, *Mahomet*, and (anciently) *Mahound*.

he moved his whole body violently, 'as if descending a mountain.' His gait and presence altogether were extremely imposing. In his 40th year M. received his first 'revelation,' in other words, became first aware that he had a 'mission.' About the year 600, Christianity had penetrated into the heart of Arabia, through Syria on the one hand and Abyssinia on the other. Judaism was no less prominent in the peninsula, chiefly in its n. parts, which were dotted over with Jewish colonies, founded by emigrants after the destruction of Jerusalem; and round about Yathrib (Medina). Besides these two all-important religious elements, several sects, remnants of the numerous ancient sects which had sprung up everywhere during the first Christian centuries: Sabians, Mandæans, etc., on the frontiers of Syria and Babylonia, heightened the religious ferment which, shortly before the time of M., had begun to move the minds of the thoughtful in all that portion of the East. At that time there arose, according to undoubted historical accounts, several men in the Hedjaz (Waraka, Obeid Allah, Othman, Zayd, etc.), who preached the futility of the ancient pagan creed, with its star-worship, its pilgrimages, and festive ceremonies, its temples and fetiches. It had in reality long ceased to be a living faith, and only the great mass of the people clung to it as to a sacred inheritance from times immemorial. The unity of God, the 'ancient religion of Abraham,' was the doctrine promulgated by these forerunners of M., and many of those who, roused by their words, began to search for a form of religion which should embody both the traditions of their forefathers and a purer doctrine of the Divinity, turned either to Judaism or to Christianity. The principal scene of these missionary labors was Mecca, then the centre of the pilgrimages of most of the Arabian tribes, and where, from times immemorial, long anterior to the city itself, the Kaaba (q.v.), Mount Arafat, the Valley of Mina, etc., were held sacred—the Koreish, M.'s tribe, having the supreme care over these sanctuaries, ever since the 5th c. It was under these circumstances that M. felt 'moved' to teach a new faith, which should dispense with idolatry on the one, as with Judaism and Christianity on the other hand. He was 40 years of age when he received the first 'divine' communication in the solitude of the mountain Hirâ, near Mecca. He declared that Gabriel appeared to him, and in the name of God commanded him to 'read'—that is, to preach the true religion, and to spread it abroad by committing it to writing (Sur. xcvi.). How far M. was a 'prophet,' in the usual sense of the word, has been the subject of endless and utterly futile discussions in the Christian world. That he was no vulgar impostor, is now as generally recognized as that other once popular doctrine, that he was in conscious league with the devil, is rejected by thinking men. What part his epilepsy had in his 'visions,' we are not able to determine. Certain it is that, after long and painful solitary broodings, a something—not clearly known to himself—at times moved

him with such fearfully rapturous vehemence, that, during his revelations, he is said to have roared like a camel, and to have streamed with perspiration; his eyes turned red, and the foam stood before his mouth. The voices he heard were sometimes those of a bell, sometimes of a man, sometimes they came in his dreams, or they were laid in his heart. Waraka, one of his wife's relatives, who had embraced Judaism, spoke to him of the Jewish doctrine, and told him the story of the patriarchs and Israel; not so much as it is told in the Bible, but as in the Midrash; and the gorgeous hues of the legendary poetry of the latter seem to have made as deep an impression on M.'s poetical mind as the doctrine of the unity of God and the *morale*—in its broad outlines—of the Old Testament, together with those civil and religious laws, scriptural and oral, which are either contained as germs or fully developed in this record. Christianity exercised a minor influence on him and his spiritual offspring. All his knowledge of the New Testament was confined to a few apocryphal books, and with whatever reverence before Jesus, whom, together with Moses, he calls the greatest prophet, next to himself, his notions of the Christian religion and its founder were excessively vague. For some details on these points, see KORAN: MOHAMMEDANISM.

His first revelation (about 610) he communicated to no one, as it appears, except to Chadîdja, to his daughters, his stepson Ali, his favorite slave Zaid—whom he had probably freed and adopted by this time—and to his friend the prudent and honest Abu Bekr. His other relatives rejected his teachings with scorn. Abu Lahba, his uncle, called him a fool; and Abu Talib, his adoptive father, though he never ceased, for the honor of his family, to protect him, yet never professed any belief in M.'s words. In the fourth year of his mission, however, he had made 40 proselytes, chiefly slaves and people from the lower ranks; and now first some verses were revealed to him, commanding him to come forward publicly as a preacher, and to defy the scorn of the unbelievers. With all his power, he now inveighed against the primeval superstition of the Meccans, and exhorted them to a pious and moral life, and to the belief in an all-mighty, all-wise, everlasting, indivisible, all-just, but merciful God, who had chosen him as he had chosen the prophets of the Bible before him, so to teach mankind that they should escape the punishments of hell, and inherit everlasting life. God's mercy—this was a primitive doctrine, common to the whole East—was to be obtained principally by prayer, fasting, and almsgiving. The belief in the sacredness of the Kaaba and the ceremonies of the old heathen pilgrimage was too firmly rooted in his and the people's minds not to be received into the new creed; but certain barbarous habits of the Bedouins, such as the killing of their new-born daughters, were ruthlessly condemned by M. The prohibition of certain kinds of food also belongs to this first period, when he as yet stood

entirely under the influence of Judaism; the prohibition of gambling, usury, etc., probably being of somewhat later date. Whether he did or did not understand the art of writing and reading at the commencement of his career, is not clear; certain it is that he pretended not to know it, and employed the services of amanuenses for his Koranic dicta, which at first consisted merely of brief, rhymed sentences in the manner of the ancient Arabic soothsayers (see KORAN). The Meccans did not object to his doings; they considered him a common 'poet' or 'soothsayer,' who, moreover, was not in his right senses, or simply a liar. Gradually, however, as the number of his converts increased, they began to give more and more attention to his proceedings; and finally, fearing mostly for the sacredness of Mecca, which the new doctrine might abolish, thus depriving them of their chief glory and the ample revenues of the pilgrimages, they rose in fierce opposition against the new prophet and his adherents, who dared 'to call their ancient gods idols, and their ancestors fools.' Many of the converted slaves and freedmen had to undergo terrible punishments; others suffered so much at the hands of their own relatives, that they were fain to revoke their creed; so that the prophet himself advised his followers to emigrate to Abyssinia. M. himself, though protected by the strong arm of Abu Talib, was yet at that time so low-spirited and fearful, that he even raised in his doctrine the idols, which hitherto he had represented as naught, to intermediate beings between God and man—a dictum, however, which he soon revoked as an inspiration of Satan, thereby increasing the hatred of his adversaries, at whose head stood two members of the family of Machzûm, Al-Walid and Abulhakam Amr (called by Mohammed 'Father of Foolishness'), who in every way threw ridicule on him. At last it became necessary that he should be put beyond the reach of his persecutors, and Abu Talib hid him in a fortified castle of his own in the country. Hamza, his uncle, and Omar, formerly a bitter enemy of M., and who afterward became, next to M. and Abu Bekr, the third head of Islam, continued in the mean time to spread the new doctrine. The Koreish now demanded that M. should be delivered into their hands; but Abu Talib steadfastly refused to comply with their wishes; a feud thereupon broke out between their family and that of the Hashemites, and M. and all the members of his family, except, perhaps, Abu Lahab, were excommunicated. After three years, however, the 'peace party' in Mecca brought about a reconciliation, and M. was allowed to return. A great grief befell him at this time—his faithful wife Chadîdja died, and, shortly afterward, his uncle Abu Talib, and, to add to his misery, the vicissitudes of his career had reduced him by this time to poverty. An emigration to Taïf, where he sought to improve his position, proved a failure; it was with great difficulty that he escaped with his life. During this epoch, he had the well-known dream of his journey to

Jerusalem and in the heavens on the back of the Borak (Miraj), (see AL-BORAK), the relation of which caused even his stanchest adherents to smile at his hallucination. Shortly after his return from Taïf, he married Sauda, and afterward so increased the number of his wives, that at his death he left nine, of whom Ayeshah, daughter of Abu Bekr, and Hafsa, daughter of Omar, are best known. In the midst of his vain endeavors to find a hearing in his own city, and cities near it, he succeeded, during a pilgrimage, in converting several men of Medina, whose inhabitants had long been accustomed to hear from the mouths of the numerous Jews living in the city and its neighborhood the words Revelation, Prophecy, God's Word, Messiah: to the Meccans mere sounds without any meaning. The seed sown in the prepared minds of these men bore a fruitful harvest. The next pilgrimage brought 12, and the third more than 70 adherents to the new faith from Medina, and with these he entered into close alliance. M. now conceived the plan to seek refuge in the friendly city of Medina, and about 622 (10, 13, or 15 years—according to the different traditions—after his first assuming the sacred office) he fled thither, about 100 families of his faithful flock having preceded him, accompanied by Abu Bekr, and reached, not without danger, the town, called thence Medinat Annabi (City of the Prophet), or Medina 'City,' by way of eminence; and from this flight, or rather from the first month of the Arabic year preceding it (i.e., 68 days earlier), dates the Mohammedan Era [Hedjrah], A.D. 622, July 15 or 16 (see HEGIRA). Now everything was changed to the advantage of the prophet and his religion; and while the incidents of his previous life are shrouded in comparative obscurity, those after this date are known often to their insignificant details. Formerly a despised 'madman or impostor,' he now assumed at once the position of highest judge, lawgiver, and ruler of the city and two most powerful Arabic tribes. His first care was directed toward the consolidation of the new worship, and the inner arrangements in the congregation of his flock; his next chief endeavor was to proselytize the numerous Jews who inhabited the city, to whom, besides having received their principal dogmas into his religion, he made many important concessions also in the outer observances of Islam, and concluded alliances with many of their tribes; but he was sorely disappointed in his hopes to convert them. They ridiculed his pretension to be the Messiah, and so enraged him by their constant taunts, that he soon abrogated his concessions, and became their bitterest adversary up to the hour of his death. The most important act in the first year of the Hedjrah was his permission of his followers to go to war with the enemies of Islam in the name of God—a kind of manifesto directed chiefly against the Meccans. Not being able at first to fight his enemies in open field, he endeavored to weaken their power by attacking the caravans of the Koreish on their way to Syria. Being successful

enough to disturb their trade, and, at the same time, to conclude alliances with the adjoining Bedouin tribes, he at last dared to break even the peace of the sacred month of Radjab, and with this the signal to open warfare was given. A battle, the first, was fought between 314 Muslims and about 600 Meccans at Badr, in the second year of the Hedjrah; the Muslims gained the victory, and made many prisoners. A great number of adventurers now flocked to M.'s side, and he successfully continued his expeditions against the Koreish and the Jewish tribes, chiefly the Beni Keinukâ, whose fortified castles he took after a long siege. Notwithstanding a severe loss which he suffered in the battle near Ohod, in which he himself was dangerously wounded, his power increased so rapidly that as early as in the sixth year of the Hedjrah (A.D. 628) he was able to proclaim a public pilgrimage to Mecca. Although the Meccans did not allow this to be carried out, he gained the still greater advantage that they concluded a formal peace with him, and thus recognized him as an equal power and belligerent. He was now allowed to send his missionaries all over Arabia, and even beyond the frontiers, without any hindrance; and in the following year he had the satisfaction of celebrating the pilgrimage for three days undisturbed at Mecca. Shortly afterward, during his expeditions against the Jews of Chaibar and Fadak, M. very nearly lost his life: a Jewess, Zainab by name, a relative of whom had fallen in the fight against him, placed a poisoned piece of roast meat before him, and though he merely tasted it, he yet, till his death, suffered from the effects of the poison. His missionaries at this time began to carry his doctrines abroad, to Chosroes II., to Heraclius, to the king of Abyssinia, the viceroy of Egypt, and the chiefs of several Arabic provinces. Some received the new gospel; but Chosrû Parvis, King of Persia, and Amru the Ghassanide, rejected his proposals with scorn, and the latter put to death his messenger. This was the cause of the first war between the Christians and the Muslims, in which the Muslims were beaten by Amru with great loss. The Meccans now thought the long-desired moment of revenge at hand, and broke the peace by several acts of violence against the Chuzaites, allies of M.; but he marched at the head of 10,000 men against Mecca, before its inhabitants had time to prepare for the siege, took it, and was publicly recognized by them as chief and prophet. With this the victory of the new religion was secured in Arabia. While, however, employed in destroying all traces of idolatry in the besieged city, and fixing the minor laws and ceremonies of the true faith, M. heard of new armies which several warlike Arabic tribes were bringing against him, and which were concentrated near Taïf (630). Again he was victorious, and his dominion and creed extended further and further every day. From all parts flocked the deputations to do homage to him in the name of the various tribes, either as the messenger of God, or at least as the Prince of Arabia; and the

year 8 of the Hedjrah (A.D.630) was therefore called the year of the Deputations. Once more he made extensive preparations for a war against the Byzantines; but not being able to bring together a sufficient army, he had to be satisfied with the homage of a few minor princes on his way to the frontiers, and to return without fulfilling his intention. Toward the end of the 10th year of the Hedjrah (A.D. 631) he undertook, at the head of at least 40,000 Muslims, his last solemn pilgrimage to Mecca, and there (on the Mount Arafat—q.v.) instructed them in all the important laws and ordinances, chiefly of the pilgrimage; and the ceremonies observed by him on that occasion were fixed for all times (see HAJJ). He again solemnly exhorted his believers to righteousness and piety, recommending them chiefly to protect the weak, the poor, and the women, and to abstain from usury.

Returned from Mecca, M. occupied himself again with planning his expedition against Syria, but fell dangerously ill very soon after his return. One night, while suffering from an attack of fever, he went to the cemetery of Medina, and prayed and wept upon the tombs, praising the dead, and wishing that he himself might soon be delivered from the storms of this world. For a few more days he went about; at last, too weak further to visit his wives, he chose the house of Ayeshah, near a mosque, as his abode during his sickness. He continued to take part in the public prayers as long as he could; until at last, feeling that his hour had come, he once more preached to the people, recommending Abu Bekr and Usma, the son of Zaid, as the generals whom he had chosen for the army. He then asked, like Moses, whether he had wronged any one, and read to them passages from the Koran, preparing the minds of his hearers for his death, and exhorting them to peace among themselves, and to strict obedience to the tenets of the faith. A few days afterward, he asked for writing materials, probably in order to fix a successor to his office as chief of the faithful; but Omar, fearing he might chose Ali, while he himself inclined to Abu Bekr, would not allow him to be furnished with them. In his last wanderings he spoke only of angels and heaven. He died in the lap of Ayeshah, about noon of Monday the 12th (11th) of the third month, in the year 11 of the Hedjrah (A.D. 632, June 8). His death caused immense excitement and distress among the faithful, and Omar, who himself would not believe in it, tried to persuade the people of his still being alive. But Abu Bekr said to the assembled multitude: 'Whoever among you has served Mohammed, let him know that Mohammed is dead; but he who has served the God of Mohammed, let him continue in his service, for he is still alive, and never dies.' While his corpse was yet unburied, the quarrels about his successor, whom he had not been able definitively to appoint, commenced; and finally, Abu Bekr received the homage of the principal Muslims at Medina. M. was then buried in the night June 9–10, after long discussions, in the house of

Ayeshah, where he had died, and which afterward became part of the adjoining mosque.

This, in briefest outline, is M.'s career, not presenting at any length, either the peculiar circumstances of his inner life, which preceded and accompanied his 'prophetic' course, nor the part which Idolatry, Judaism, Christianity, and his own reflection respectively, bore in the formation of his religion; nor tracing the process by which his 'mission' grew upon him, and he, from a simple admonisher of his family, became the founder of a faith to which more than 130 millions are said now to adhere. For some further details on his doctrine and its history, see KORAN: MOHAMMEDANISM: also MOHAMMEDAN SECTS: SUNNA: SUNNITES: SHIITES. It is to be remembered that a man of M.'s extraordinary powers and peculiar nature is not to be judged by a modern commonplace standard; also the manners and morals of his own time and country must be taken into consideration. His character certainly is not praiseworthy. He was at times deceitful, cunning, revengeful, and cowardly; he ordered many assassinations, and massacred at one time 600 Jews; and he was addicted to sensuality beyond all limits. But all this does not justify the savage and silly abuse which has been heaped upon his name for centuries by ignorance and fanaticism. Consideration must be had not only of his public station as prophet, preacher, and prince, but also his general amiability, his faithfulness toward his friends, his tenderness toward his household, and his occasional readiness to forgive an enemy: moreover the extreme simplicity of his domestic life (he lived, when in full power, in a miserable hut, mended his own clothes, and freed all his slaves), must be taken into consideration: and, to do him justice, his melancholic temperament, his nervousness often bordering on frenzy and which brought him to the brink of suicide, and the fact that he was a poet of high order, with all the weaknesses of a poet developed to excess, must not be forgotten. Altogether, his mind contained the strangest mixture of nobleness and baseness, of truth and error. Although his self-chosen mission was the abolition of superstition, he yet believed in Jins, omens, charms, and dreams: and this is an additional reason against the now generally abandoned notion, that he was a vulgar designer, who by no means deceived himself about those revelations which he pretended to have received. And however much the religion of Islam may be considered the bane and prime cause of the rottenness of eastern states and nations in our day, it must not be forgotten, in the first place, that it is not necessarily Islam which has been the sole cause of the corruption; and in the second place, that Mohammed is not to be made responsible for all the errors of his successors. Fanaticism may be the secret of the strange mixture in his character, and the source of his consuming zeal; partly the fanaticism of a stern rude justice, partly the fanaticism of a self-exaltation verging on mental disorder, and drawing from his cataleptic fits

the fabric of those hallucinations which he accepted and proclaimed as revelations from God. His fanaticism seems to have become less honest as his power advanced, and his later years give signs of that hypocrisy which seeks to use spiritual motives for merely political ends.

The most important European biographies of M. are those of Sprenger, Weil, Muir, Nöldeke, Reinaud.

MOHAM'MED II. (BUJUK or THE GREAT), Sultan of Turkey: conqueror of Constantinople: 1430–81 (reigned 1450–81); b. Adrianople; son and successor of Amurath II. His first acts were the murder of his two brothers, and the suppression of a rebellion in Karaman. Having thus secured himself on the throne, he bent all his energies to the great project always kept prominently in view by his predecessors—the capture of Constantinople. This city was now the sole remnant of the once mighty empire of the Cæsars; and after more than a year spent in preparations, M. commenced the siege, 1453, Apr. 6, with an army of 258,000 men, and a fleet of 320 vessels. The Greeks, aided by a gallant band of 2,000 strangers, under Gian Justiniani, a noble Genoese, long maintained an obstinate resistance. On the morning of May 29, a combined attack was made by land and sea without success; but the retirement from the ramparts of Justiniani, who had been severely wounded, and despaired of a successful defense, caused a panic among his followers, and the simultaneous charge of a chosen body of janizaries, with M. himself at their head, was irresistible. Constantine XIII. died in the breach, and the Turks poured in over his corpse to plunder and devastate his capital. M. transferred the seat of his government to Constantinople, and sought to win back the inhabitants by promising them free exercise of their religion. He next reduced the kingdoms of Morea and Trebizond, offshoots of the Greek empire, obtained possession of Servia on the death of its last prince, and made formidable preparations for invasion of Hungary. Belgrade was the first point of attack; and with 100,000 men, supported by a fleet of 200 ships on the Danube, M. sat down before its walls. The enormous ordnance which had done such good service at Constantinople, were employed to batter the ramparts; but the valor, skill, and activity of the defenders foiled his utmost efforts. John Hunyady (q.v.), who, with 5,000 chosen troops, had reinforced the garrison, destroyed or captured all his vessels, and soon afterward by a sudden sally, defeated his army, and carried off the battering-train, compelling him to raise the siege, 1456, Aug. 6. M.'s next enterprise was the invasion of Epirus, where Scanderbeg had hitherto successfully defied the sultan's power. Three Turkish armies were destroyed in rapid succession, and a fourth and fifth under M. himself met with no greater success; but the death of the gallant Epirote, 1467, removed the only obstacle to the sultan's plans, and Epirus was forthwith annexed to Turkey. The latter half of M.'s reign was fruitful in important achievements; he reduced the Khan

of the Crimea to the condition of a vassal, deprived the Genoese of Caffa, and the Venetians of Friuli, Istria, Negropont, and Lemnos; but the Knights of St. John repelled him from Rhodes, and the Venetians from Scodra. He carried his arms into Italy, and took Otranto; but died at Nicomedia, while on the way to join his son Bajazet, who was warring with the Persians and Egyptians. His frequent contests with the former of these nations had always interfered with the successful prosecution of his designs of conquest in Europe. M. had great abilities; he was brave, enterprising, and sagacious; nor was he deficient in learning, for he spoke four languages fluently, was well versed in geography, ancient history, and the natural sciences, and was practically acquainted with the fine arts. But the brilliancy of his career, and the occasional generosity and even magnanimity which he showed, cannot obliterate the recollection of those acts of cruelty and treachery which have justly branded him as the most ruthless tyrant of the House of Osman. As the founder of the Turkish power in Europe, his memory has always been revered by the Turks.

MOHAM'MEDANISM: the religion founded by Mohammed (q.v.); according to him, the only orthodox creed existing from the beginning of the world, and preached by all the prophets ever since Adam. It is called also *Islâm*, Resignation, entire Submission to the will and precepts of God. In its exclusively dogmatical or theoretical part, it is *Imán*, Faith; in its practical, *Dín*, Religion (by way of eminence). The fundamental principles of Imán are contained in the two articles of belief: 'There is no God but God; and Mohammed is God's Apostle.' The Mohammedan doctrine of God's being and attributes coincides with the Christian, so far as relates to him as the Creator of all things in heaven and earth, who rules and preserves all things; who is without beginning, omnipotent, omniscient, omnipresent, and full of mercy. Yet, according to the Mohammedan belief, God has no offspring: 'He begetteth not, nor is he begotten.' Nor is the Lord Jesus called anything more than a great prophet and apostle, though his birth is said to have been due to a miraculous divine operation; and as the Koran superseded the Gospel, so Mohammed, Christ. The crucifixion is said to have been executed upon another person, Christ having been taken up into God before the decree was carried out. He will come again upon the earth, to establish everywhere the Moslem religion, and to be a sign of the coming of the day of judgment. Next to the belief in God, that in angels forms a prominent dogma. Created of fire, and endowed with a kind of uncorporeal body, they stand between God and man, adoring or waiting upon the former, or interceding for and guarding the latter. The four chief angels are 'The Holy Spirit,' or 'Angel of Revelations'—Gabriel; the special protector and guardian of the Jews—Michael; the 'Angel of Death'—Azraël (Raphael, in the apocryphal gospel of Barnabas), and Israfil—Uriel, whose office it will be to

sound the trumpet at the Resurrection. Most of Mohammed's 'religious' notions were taken almost bodily from the Jewish legends; his angelology, however, the Jews themselves had not received from their Scriptures, but had borrowed from the Persians, only altering the names, and, in a few cases, the offices of the chief angelic dignitaries (see ANGEL: ARCHANGEL). Besides angels, there are good and evil genii or Jinn (q.v.), the chief of the latter being Iblis (Despair), once called Azazil, who, refusing to pay homage to Adam, was rejected by God. These Jinn are of a grosser fabric than angels, and subject to death. They, too, have different names and offices (Peri, Fairies; Div, Giants; Takvíns, Fates, etc.), and are, in almost every respect, like the Shédim in the Talmud and Midrash. A further point of the system is the belief in certain Scriptures, revealed from God successively to the different prophets. Four only of the original 104 sacred books: viz., the Pentateuch, the Psalms, the Gospel, and the Koran, are said to have survived; the three former, however, in a mutilated and falsified condition. Besides these, a certain apocryphal gospel, attributed to St. Barnabas, and the writings of Daniel, together with those of a few other prophets, are noticed by the Moslems, but not as canonical books. The number of prophets, sent at various times, is stated variously at between two and three hundred thousand; among whom 313 were apostles, and six were specially commissioned to proclaim new laws and dispensations, which abrogated the preceding ones. These were Adam, Noah, Abraham, Moses, Jesus, and Mohammed—the last the greatest of them all, and the propagator of the final dispensation. The belief in the resurrection and the final judgment is the next article of faith. The dead are received in their graves by an angel announcing the coming of the two examiners, Monker and Nakîr, who put questions to the corpse respecting his belief in God and Mohammed, and who, in accordance with the answers, either torture or comfort him. This, again, is the Jewish 'Chibbut hakkeber,' the Beating of the Grave, a hyperbolical description of the sufferings during the intermediate state after death (purgatory). The soul, awaiting the general resurrection, enters according to its rank, either immediately into paradise (prophets), or partakes, in the shape of a green bird, of the delights of the abode of bliss (martyrs), or—in the case of common believers—is supposed either to stay near the grave, or to be with Adam in the lowest heaven, or to remain either in the well of Zem-Zem, or in the trumpet of the resurrection. According to others, it rests in the shape of a white bird under the throne of God. The souls of the infidels dwell in a certain well in the province of Hadramaut (Heb. Chambers of Death), or, being first offered to heaven, then offered to earth, and rejected by either, remain subject to unspeakable tortures until the day of resurrection. Concerning the latter, there is great discrepancy among the Mohammedan theologians. Mo-

hammed himself seems to have held that both soul and body will be raised, and the 'Bone Luz' of the Jewish Haggadah was by him transformed into the bone Al A'b, the rumpbone, which will remain uncorrupted till the last day, and from which the whole body will spring anew, after a 40 days' rain. Among the signs by which the approach of the last day may be known—nearly all taken from the legendary part of the Talmud and Midrash, where the signs of the coming of the Messiah are enumerated—are the decay of faith among men, the advancing of the meanest persons to highest dignities, wars, seditions, and tumults, and consequent dire distress, so that a man passing another's grave shall say: 'Would to God I were in his place!' Certain provinces shall revolt, and the buildings of Medina shall reach to Yahâb. Again: the sun will rise in the west, the Beast will appear, Constantinople will be taken by the descendants of Isaac, the Anti-Christ will come, and be killed by Jesus at Lud. There will further take place a war with the Jews, Gog and Magog's (Jajug and Majuj's) eruption, a great smoke, an eclipse, the Mohammedans will return to idolatry, a great treasure will be found in the Euphrates, the Kaaba will be destroyed by the Ethiopians, beasts and inanimate things will speak, and finally, a wind will sweep away the souls of those who have faith, even if equal only to a grain of mustard seed, so that the world shall be left in ignorance. The time of the resurrection, even Mohammed could not learn from Gabriel: it is a mystery. Three blasts will announce it: that of consternation, of such terrible powers, that mothers shall neglect the babes on their breasts, and that heaven and earth will melt; that of exanimation, which will annihilate all things and beings, even the angel of death, save paradise and hell, and their inhabitants: and forty years later, that of resurrection, when all men, Mohammed first, shall have their souls breathed into their restored bodies, and will sleep in their sepulchres until the final doom has been passed upon them. The day of judgment, lasting from one to 50,000 years, will call up angels, genii, men, and animals. The trial over, the righteous will enter paradise, to the right hand, and the wicked will pass to the left, into hell; both, however, have first to go over the bridge Al Sirât, laid over the midst of hell, and finer than a hair, and sharper than the edge of a sword, and beset with thorns on either side. The righteous will proceed on their path with ease and swiftness, but the wicked will fall down headlong to hell below—a place divided into seven stories or apartments, respectively assigned to Mohammedans, Jews, Christians, Sabians, Magians, idolators, and—the lowest of all—to the hypocrites, who, outwardly professing a religion, in reality had none. The degrees of pain—chiefly consisting in intense heat and cold—vary; but the Mohammedans, and all those who professed the unity of God, will finally be released, while unbelievers and idolaters will be condemned to eternal punishment. Paradise is divided from hell by a parti-

tion (Orf), in which a certain number of half-saints will find place. The blessed, destined for the abodes of eternal delight (Jannat Aden, Heb. Gan Eden)—of which it is, however, not quite certain whether it is created already—will first drink of the Pond of the Prophet, which is supplied from the rivers of paradise, whiter than milk, and more odoriferous than musk. Arrived at one of the eight gates, they will be met by beautiful youths and angels; and their degree of righteousness (prophets, religious teachers, martyrs, common believers) will procure for them the corresponding degree of happiness. It is, however, the Mohammedan doctrine, that not a person's good works or merits will gain his admittance, but solely God's mercy; also that the poor will enter paradise 500 years before the rich; and that the majority of the inhabitants of hell are women. As to the various felicities which await the pious (and of which there are about a hundred degrees), they are a wild conglomeration of Jewish, Christian, Magian, and other fancies on the subject, to which the Prophet's own exceedingly sensual imagination has added considerably. Feasting in the most gorgeous and delicious variety, the most costly and brilliant garments, odors and music most ravishing, and above all, the enjoyment of the Hûr Al Oyûn, the black-eyed daughters of paradise, created of pure musk, and free from all the bodily weaknesses of the female sex, are held out as a reward to the commonest inhabitants of paradise, who will always remain in the full vigor of their youth and manhood.* For those deserving a higher degree of recompense, rewards will be prepared of a purely spiritual kind—i.e., the 'beholding of God's face' (Shechinah) by night and by day. A separate abode of happiness will also be reserved for women, but there is considerable doubt as to the manner of their enjoyment. That they are not of a prominently spiritual nature, is clear from the story of the Prophet and the old woman. The latter solicited Mohammed to intercede with God that she might be admitted into paradise, whereupon he replied that old women were not allowed in paradise, which dictum—causing her to weep—he further explained by saying that they would first be made young again. The last of the precepts of pure faith taught by Mohammedanism is the full and unconditional submis-

* 'The whole earth will be as one loaf of bread, which God will reach to them like a cake; for meat they will have the ox Balâm and the fish Nûn, the lobes of whose livers will suffice 70,000 men. Every believer will have 80,000 servants and 72 girls of paradise, besides his own former wives, if he should wish for these, and a large tent of pearls, jacinths, and emeralds: 300 dishes of gold shall be set before each guest at once, and the last morsel will be as grateful as the first. Wine will be permitted, and will flow copiously, without inebriating. The righteous will be clothed in the most precious silks and gold, and will be crowned with crowns of the most resplendent pearls and jewels. If they desire children, they shall beget them, and see them grow up within an hour. Besides the ravishing songs of the angel Israfil and the daughters of paradise, the very trees will, by the rustling of their boughs, the clanging of bells suspended from them, and the clashing of their fruits, which are pearls and emeralds, make sweetest music.'

sion to God's decree (ISLAM—see ISLAMISM), and the predestination of good and evil, which is found from the beginning inscribed on a 'preserved table.' Not only a man's fortunes, but his deeds, and consequently his future reward or punishment, are irrevocably, and thus unavoidably, pre-ordained (see FATE: FATALISM): a doctrine which is not, however, taken literally by *all* Moslems, but which has no doubt contributed largely to the success of Islam, by inspiring its champions with the greatest indifference and contempt for the dangers of warfare; their destiny being immutably fixed under any circumstances.

Thus far, briefly, the Iman, dogmatical or theoretical part of Islam. The Din, or practical part, which contains the ritual and moral laws, inculcates as the chief duties the following four: prayer, almsgiving, fasting, and pilgrimage.

Prayer, 'the key of paradise,' comprises also certain religious purifications, as the most necessary preparations to the former. They are of two kinds: the *Ghusl*, or total immersion of the body, required as a religious ceremony, on some special occasions; and the *Wudú*, a partial ablution, to be performed immediately before the prayer. This is of primary importance, and consists of the washing of hands, face, ears, and feet up to the ankles—a proceeding generally accompanied at each stage by corresponding pious sentences, and concluded by the recital of the 97th chapter of the Koran. In the case of water being beyond reach, dry dust or sand may supply its place. 'The practice of religion being founded on cleanliness,' it is not sufficient that the believer himself should be purified, but even the ground or the carpet upon which he prays must be as clean as possible, and the use of a special prayer-carpet (Seggadéh) is therefore recommended. Every Mohammedan is obliged to pray five times in every 24 hours. The prayer (Salah) itself consists partly of extracts from the Revealed Book, the Koran (Fard), partly of pieces ordained by the Prophet without allegation of a divine order (Sunnah—q.v.). The first time of prayer commences at the Maghrib, or about sunset; the second, at the Eshë, or nightfall; the third, at the Subh, or daybreak; the fourth, at the Duhr, or about noon; the fifth, at the Asr, or afternoon. The believers are not to commence their prayers exactly at sunrise, or noon, or sunset, lest they might be confounded with the infidel Sun-worshippers. These several times of prayer are announced by the Muëzzins (q.v.) from the minarets or madnehs of the mosques. Their chant, sung to a very simple but solemn melody, sounds harmoniously and sonorously down the height of the mosque, through the midday din and roar of the cities, but its impression is most strikingly poetical in the stillness of night; so much so, that even many Europeans cannot help congratulating the Prophet on his preferring the human voice to either the Jewish trumpet-call of the time of the Temple, or the Christian church-bells. The day-call

(the Adan) consists chiefly of the confession of faith (God is most great—Mohammed is God's apostle—come to prayer, come to security) repeated several times; the night-calls (Ula, the first; Ebed, the second), destined for persons who desire to perform supererogatory acts of devotion, are much longer. The believer often changes his posture during his prayers; and a certain number of such inclinations of head and knees, prostrations, etc., is called a Rekah. It is also necessary that the face of the worshipper should be turned toward the Kibleh, in the direction of Mecca (q.v.), the exterior wall of the mosque marking that direction being distinguished by a niche (Mehrab). All sumptuous and pompous apparel is laid aside before the believer approaches the sacred place; and the extreme solemnity and decorum, the unaffected humility, the real and all-absorbing devotion which pervades it, have been often held up as an example to other creeds. Women, though not strictly forbidden to enter the mosque, yet are not practically allowed to pray there, lest their presence might be hurtful to true devotion. Besides these prayers, there are others ordained for special occasions, as on a pilgrimage, before a battle, at funerals, during an eclipse, etc. That the Moslems do not pray *to* Mohammed, but simply implore his intercession, as they do that of the numerous saints, the relatives of the Prophet, and the first propagators of Islam, need not be dwelt upon here (see MOHAMMED). For the particulars of the service in the Mosque, see MOSQUE. Mohammedanism has no clergy in our sense of the word, the civil and religious law being combined in one. See also MOLLAH: MUFTI.

Next in importance stands the duty of giving alms. These are twofold—legal (Zekah) and voluntary (Sadakah; Heb. Zedakah, piety, righteousness); but the former, formerly collected by the sovereign, and applied to pious uses, has now been practically abrogated. The Sadakah is, according to the law, to be given once every year, of cattle, money, corn, fruits, and wares sold, at about the rate of from two and a half up to twenty per cent. Besides these, it is usual to bestow a measure of provisions on the poor, at the end of the sacred month of Ramadán.

The duty of fasting follows (see FAST—*Fasting*). During the whole month of Ramadán, the Moslem is commanded to refrain from eating, drinking, smoking, smelling perfumes, bathing, and every unnecessary indulgence in worldly pleasure—from daybreak until sunset. From sunset till the morning, he is allowed to eat, drink, and enjoy himself. The Arabian year being lunar, it often happens that the Ramadán falls in midsummer, when the fasting, especially the abstaining from drinking, is excessively mortifying. None are exempt from this duty save the sick, travellers, and soldiers in time of war; but they are bound to fast an equal number of days during some other months. Nurses and pregnant women are entirely free from fasting. It is Mohammed's special and express desire, that no one should fast who is not quite equal to

it, lest he might injure his health, and disqualify himself for necessary labor. Of the other commendable fast-days, the Ashura, on the 10th of Moharram (the Jewish Jom Kippur), deserves special mention. There are very few Moslems who do not keep the Ramadán, even if they neglect their other religious duties; at all events, they all pretend to keep it most strictly, fasting being considered 'one-fourth part of the faith'—nay, 'the gate of religion.'

For the fourth paramount duty of the Mohammedan—the pilgrimage to Mecca—see MECCA: especially HAJJ. Suffice it here briefly to recapitulate, that the Kaaba (q.v.) is to be encompassed seven times, the celebrated black stone being kissed at each round, that Mount Arafat (q.v.) is to be visited, the sacrifice El-Fida (the Ransom, in memory of Ishmael's sacrifice) to be performed, and a number of minor ceremonies to be gone through by the pilgrim, and that he who neglects to perform the sacred pilgrimage 'might as well die a Jew or a Christian.'

To the 'positive' ordinances of Islam may be reckoned also the 'Saghir,' or minor, and 'Kebir,' or great, festivals (see FESTIVALS). The first (Al-Fetr, or breaking the fast), following immediately upon the Ramadán, begins on the first day of the month of Shawál, and lasts three days. The second (Eed Al-Kurban, or sacrifice) begins on the 10th of Dsu'l Heggeh, when the pilgrims perform their sacrifice, and lasts three or four days. Yet, though intended to be the most important of the two, the people have in most places changed the order, and, by way of compensation for the previous fast, they make the lesser festival which follows the Ramadán the most joyful and the longest of the two. The day set aside for the weekly day of rest is the Friday—not, as is generally supposed, because both the Jewish Sabbath and the Christian Lord's Day were to be avoided, but because, from times long before Mohammed, the Arabian people used to hold public assemblies for civil as well as religious purposes on that day. The celebration of the Moslem days of religious solemnity is far less strict than is the custom with the other Shemitic religions. Service being over, the people are allowed to return to their worldly affairs, if they cannot afford to give themselves up entirely to pleasure or devotion for the rest of the sacred period.

Thus far, briefly, the principal positive laws of Islam relating to faith and practice. We turn to the fundamental prohibitory laws contained in the Koran.

First of all, the drinking of wine, which includes all strong and inebriating liquors, as giving rise to 'more evil than good,' is rigorously forbidden; and though of late, chiefly through European influence, very many Moslems have lost their religious scruples on that score, and not only secretly, but openly, indulge in spirits, yet the great bulk of the faithful refuse even to make use of the proceeds of the sale of wine or grapes. Some over-scrupulous believers even include opium, coffee, and to-

bacco in the prohibition; but general practice has decided differently. The prohibitory laws respecting food resemble closely those of Judaism: blood, the flesh of swine, moreover animals which have died from disease or age, or on which the name of some idol has been invoked, or which have been sacrified unto an idol, or which have been strangled, or killed by a blow, a fall, or by some other beast, are strictly forbidden. 'Pure' animals must be slaughtered according to certain fixed rules, and the name of God is to be invoked before the operation, without, however, the usual addition of the benevolent epithets, since these would ill befit the sufferings of a fellow-creature. Fish, birds, game, are mostly allowed for food, yet there are in nearly all cases certain religious ceremonies to be observed, before they become fit for the believer's table.

All games subject to chance ('casting lots by arrows') —such as dice, cards, tables, bets, etc.—are considered so wicked, that a gambler's testimony is invalid in a court of law. (The Talmud rejects the testimony of only the habitual '*dice-*[Kubia—i.e., Cube] *gambler* and *better upon doves.*') Chess and other games depending on skill —provided they do not interfere with the regular performance of religious duties, and that they are played without any stakes whatsoever—are allowed by the majority of Moslem theologians. Usury is strictly prohibited. Taking interest on any loan, however large or small, or profiting in trade through any questionable means, save by buying and selling, is severely condemned.

To prevent the faithful from ever falling back into idolatry, the laws relating to images and pictures have been made very stringent. Whosoever makes an imitation of any living being in stone, wood, or any other material, shall, on the day of judgment, be asked to endow his creation with life and soul, and, on his protesting his inability of doing so, shall undergo the punishment of hell for a certain period.

The civil and criminal laws of Mohammedanism, founded both on the Koran and the Traditions (*Sunna*), are, in some instances, where the letter of the written or oral precept allows of various explanations, or where the case in question is not foreseen, interpreted according to the opinion of one of the four great masters of Islam, Abu Hanífa, Malec Ibn Ans, Sháfeï, Ibn Hanbal, within the pale of their respective sects. The principal points, however, on which all Mohammedans agree are the following: Polygamy is allowed, not, as is commonly supposed, without any restriction, but: 'Take in marriage, of the women who please you, two, three, or four; but if ye fear that ye cannot act equitably, one; or those whom your right hands have acquired'—i.e., your slaves. These are the explicit words of the Koran (iv. 3), so that four wives, and a certain number of concubine slaves, is the whole extent to which a Moslem may legally go. The Prophet's example proves nothing to the contrary,

since he was endowed with special privileges, and not subject to the common law in many respects. It is, moreover, added, as an advice, that to marry one or two is quite sufficient for a man, if he apprehend any inconvenience from a larger number of wives. A Moslem may, if urged by excessive love, or if unable to obtain a wife of his own creed, marry a Christian woman or a Jewess; but a Mohammedan woman is not, under any circumstances, to marry an unbeliever. In all cases, however, the child born of a Moslem, whatever the mother's faith, is a Moslem; nor does the wife who is an unbeliever inherit at her husband's death. Forbidden degrees of consanguinity, etc., in marriage are: the mother, daughter, sister, half-sister, aunt, niece, foster-mother, or a woman related to the faithful 'by milk in any of the degrees which would preclude his marriage with her, if she were similarly related to him by consanguinity;' the mother of his wife, even if he be not properly married to the latter yet; the daughter of his wife, if the latter still be his legal wife; his father's wife and his son's wife; or two sisters at the same time; or wives who stand to each other in the relation of aunt and niece; or the unemancipated slave, or another man's slave, if he have already a free wife. A simple declaration of a man and woman at the age of puberty, before two witnesses, of their intention to marry each other, and the payment of part of the dowry (which is indispensable, and must amount to at least ten dirhems, or about five shillings = about $1.25), is sufficient for a legal marriage. A girl under age is given away by her natural or appointed guardian, with or without her consent. To see the face of any woman who is neither his wife nor his concubine, nor belongs to any of the forbidden degrees, is strictly forbidden to the believer. Divorce is a comparatively light matter with the Mohammedans. Twice, a man may send away his wife and take her back again without any ceremony; the third time, however—if he unite the triple divorce in one sentence at once—he dare not receive her again in wedlock until she have been married properly to another man in the mean time. Mere dislike is sufficient reason for a man to dissolve the conjugal ties, and his saying: 'Thou art divorced,' or 'I divorce thee,' together with the payment of part of the wife's dowry, is all that is required from him by the law. A wife, on the other hand, is bound to her husband forever, unless she can prove some flagrant ill-usage or neglect of conjugal duty on his part; and even then, she forfeits part, or the whole, of her dowry. A divorced woman is obliged to wait, like a widow, for a certain period before marrying again: if pregnant, until delivery; three months, or four months and ten days, according to circumstances. If she have a young child, she is to suckle it until it be two years old, and the father is to bear all the expenses of the maintenance of mother and child. A woman proving disobedient to her husband may be declared by the kadi 'náshizeh'—i.e., rebellious, and the husband is no longer

bound to maintain her. Yet, he cannot be forced to divorce her under these circumstances, so that the woman is generally in so sore a plight that she is obliged to promise good behavior for the future, and the husband has then either to take her back to his house, or to set her free by a formal divorce. On the other hand, it often happens that a woman prefers a mere separation, to continuing to live with her husband; in which case she gets herself, of her own accord, inscribed a 'náshizeh.' If a slave becomes a mother by her master, and he acknowledges the child to be his own, the child is free, and the mother is to be emancipated at the master's death, and may not be given away, or otherwise disposed of by him, during his lifetime. A free person, wishing to marry his or her slave, must first emancipate this slave; and if the slave of another person has been married by a free man or woman, and afterward becomes the latter's property, the marriage becomes illegal, and can be renewed only by a legal contract and emancipation.

The privilege of primogeniture does not exist in the Mohammedan law, but males generally receive a double share. A person may not bequeath more than one-third of his property, unless there be no legal heirs. Children, whether begotten with the legal wife, or slave, or concubine, or only adopted, and their descendants, are the first heirs; next come the claims of wives, parents, brothers, sisters, in their order. Where there is no legal heir, the property falls to the crown.

The law is very lenient toward debtors, the Koran recommending the creditor to remit a debt 'as alms.' Insolvency, and inability to work for the discharge of the claim, solve all further obligations. The most conscientious performance of all private contracts, however, is constantly recommended in the Koran.

Murder is punished either with death, or by the payment of a fine to the family of the deceased, according to their own pleasure. There must, however, be palliating circumstances in the latter case. The Bedawis, however, have expanded the law of blood-revenge in a terrible manner, and up to this day the 'vendetta' often rages not only between family and family, but between whole tribes, villages, and provinces. Unintentional homicide is expiated by freeing a believer from slavery, and paying to the family a certain sum in proportion to the rank and sex of the deceased. He who has not the means of freeing a believer is to fast for two months, by way of penance. According to the strict letter of the law, a man is not liable to capital punishment for killing his own child or an infidel; but, practically, no difference is generally made by the Mohammedan governments (chiefly the Turkish) in our day. Murder is punished with death, and no fine frees the culprit.

The Mosaic law of retaliation, in case of *intentional* wounds and mutilation, holds good also for Islam—that is (not, as has ignorantly been supposed, that the corresponding limb of the offender is to be cut off), a certain

proportionate fine in money is to be paid to the injured. The payment for any of the single limbs of the human body—e.g., the nose—is the full price of blood, as for a homicide; for a limb which is found twice, like hand or foot, half; for a finger or toe, the tenth part, etc. Women and slaves have smaller claims. Injuries of a dangerous or otherwise grievous nature pay the full price; those of an inferior kind, however, bring the perpetrator within the province of the lash or cudgel, which is supposed to have 'come down from heaven, to be used by the judge for the promotion of virtue and duty.'

The Koran orders theft—of no less than the value of half-a-crown—to be punished by cutting off the chief offending limb, the right hand; the second theft is punishable by the loss of the left foot; the third, of the left hand; the fourth, of the right foot, etc.; but the ordinary punishments of imprisonment, hard labor, and the bastinado, have been substituted in our days. The property stolen must not, however, have been of easy access to the thief, nor must it have consisted of food, since he may have taken this to satisfy his hunger.

Unchastity in woman was, in the commencement of Islam, punished by imprisonment for life, for which afterward stoning was substituted in the case of a married woman, and a hundred stripes and a year's exile in the case of an unmarried free woman; a slave to undergo only half of that punishment. Yet, it is necessary that he who accuses a 'woman of reputation' of adultery or fornication shall produce four (male) witnesses, and if he be not able to do so, he is to receive fourscore stripes, nor is his testimony ever after to be received, for he is considered an 'infamous prevaricator'—unless he swear four times that he speaks the truth, and the fifth time imprecate God's vengeance if he speak false. Yet, even this testimony may be overthrown by the wife's swearing four times that he is a liar, and imprecating the fifth time the wrath of God upon herself, if he speak the truth. In the latter case, she is free from punishment; the marriage, however, is to be dissolved. Fornication in either sex is, by the law of the Koran, to be visited with a hundred stripes.

Infidelity, or apostasy from Islam, is a crime to be visited by the death of the offender, if he have been warned thrice without recanting. Severer still—that is, not to be averted by repentance or revocation of any kind, is the punishment inflicted for blasphemy—against God, Mohammed, Christ, Moses, or any other prophet. Instantaneous death is the doom of the offender; for if apostasy may be caused by error and misguidance, 'blasphemy is the sign of complete wickedness and thorough corruption of the soul.'

A further injunction of the Koran, for the carrying out of which, however, the time has nearly gone by, is that of making war against the Infidels. He who is slain while fighting in defense and for the propagation of Islam is reckoned a martyr; while a deserter from the

holy war is held up as an object of execration, and has forfeited his life in this world as well as in the world to come. At first, all the enemies taken in battle were ruthlessly slain; later, it became the law to give the people of a different faith against whom war was declared the choice of three things: either to embrace Islam—in which case they became Moslems at once, free in their persons and fortunes, and entitled to all the privileges of Moslems; or to submit to pay tribute—in which case they were allowed to continue in their religion, if it did not imply gross idolatry or otherwise offended against the moral law; or to decide the quarrel by the fortune of war—in which case the captive women and children were made slaves, and the men either slain, unless they became converts at the last moment, or otherwise disposed of by the prince. The fifth part of the spoil belongs 'to God'—that is, the Sanctuary (Kaaba, etc.)—to the apostle and his kindred, to the orphans, the poor, and the traveller.

It is to be noted that the Koran is not a systematically arranged code, and that all the laws and regulations above enumerated, though contained in it, either bodily or, as it were, in germs—further developed by the Sunna (q.v.)—are to a great extent only mentioned in an incidental manner, thrown together and mixed up, often in the strangest manner, with the most heterogeneous dicta, dogmas, moral exhortations, civil and criminal laws, etc., and are to be considered principally as supplementary to the existing laws and regulations, which they either abrogated, confirmed, or extended, according to the pressing demand of circumstances during the Prophet's life. In cases for which subsequent ages found no written rules laid down by the Prophet, traditional oral dicta were taken as the norm, and, later still, precedents of the Khalifs were binding. Hence contradictions in theory and practice have crept in, according to the different traditions and decisions of the Imams or expounders of the Law, besides the various interpretations put on the book itself within the pale of the different Mohammedan sects. The secular tribunals, therefore, frequently differ in their decisions from the judicial tribunals; and the distinction between the written civil Law of the ecclesiastical courts and the common Law, aided by the executive power, is, fortunately for justice and civilization, becoming clearer every day.

That part of Islam, however, which has undergone (because not to be circumscribed and defined by doctors) the least changes in the course of time, and which most distinctly reveals the mind of its author, is also its most complete and its most shining part—we mean the ethics of the Koran. They are not found, any more than the other laws, brought together in one, or two, or three Surahs, but 'like golden threads' they are woven into the huge fabric of the religious constitution of Mohammed. Injustice, falsehood, pride, revengefulness, calumny, mockery, avarice, prodigality, debauchery, mis-

trust, and suspicion are inveighed against as ungodly and wicked; while benevolence, liberality, modesty, forbearance, patience and endurance, frugality, sincerity, straightforwardness, decency, love of peace and truth, and, above all, trusting in God, and submitting to His will, are considered as the pillars of true piety, and the principal signs of a true believer. Mohammed never taught that form of the doctrine of absolute predestination and 'fatality' which destroys all human will and freedom by teaching that the individual's deeds cannot alter one iota in his destiny either in this world or in the next. On the contrary, foolhardiness is distinctly prohibited in the Koran (ii. 196): caution is recommended: prayer, the highest ceremonial law of Islam, is modified in case of danger: it is legal to earn one's livelihood on Friday after prayer, and to shorten the readings in the Koran for the sake of attending to business. These instances show that the Moslem is not to expect to be fed pursuant to a Divine decree, whether he be idle or not. On the other hand, a glance at the whole system of faith, built on hope and fear, rewards and punishments, paradise and hell, both to be man's portion according to his acts in this life, and the incessant exhortations to virtue, and denunciations of vice, are sufficient to prove that aboriginal predestination, such as St. Augustine taught, is not in the Koran, where only submission to God's will, hope during misfortune, modesty in prosperity, and entire confidence in the Divine plans, are supported by the argument, that everything is in the hands of the Highest Being, and that there is no appeal against His absolute decrees.

And this is one instance of the way in which most of Mohammed's dicta have been developed and explained—both by sectarians and enemies within and without Islam—in such a manner that he has often been made to teach the very reverse of what he really did teach; and thus monstrosities now found in his creed, if carefully traced back to their original sources, will, in most cases, be seen to be the growth of later generations, or the very things that he abrogated. That, again, the worst side of his character, the often wanton cruelty with which he pursued his great mission, the propagation of his faith, should by his successors have been taken as a thing to be principally imitated, is not to be wondered at, considering the brilliant success which attended his policy of the bloody sword. Scarcely a century had elapsed after Mohammed's death before Islam reigned supreme over Arabia, Syria, Persia, Egypt, the whole of the n. coast of Africa, even as far as Spain; and notwithstanding the subsequent strifes and divisions in the interior of this gigantic realm, it grew and grew outwardly, until the Crescent was made to gleam from the spires of St. Sophia at Constantinople, and the war-cry 'Allah il Allah!' resounded before the gates of Vienna. From that time, however, the splendor and the power of Mohammedanism began to wane. Although

there are counted about 130 millions this day all over the globe who profess Islam, and although it is, especially at this present juncture, making great progress among the African races, yet the number of real and thorough believers is infinitely small; and since it has left off conquering, it has lost also that energy and elasticity which promises great things.

We cannot consider in this place what Islam has done for the general good of the race, or, more exactly, what was its precise share in the development of science and art in Europe. (See the special titles relative to these subjects—especially the biographical titles referring to men eminent in every branch of human knowledge who have issued from the ranks of Islam.)

Besides the Koran, the Sunna, and the native (Arabic, Persian, Turkish, etc.) writers on the foregoing subject, see, further, the works of the European scholars Marracci, Hyde, Prideaux, Chardin, Du Ryer, Reland, D'Herbelot, Sale, De Sacy, Hammer, Burckhardt, Sprenger, Burton, Muir, Garcin de Tassy, Lane, Weil, Geiger, Nöldeke.—See CALIPH: KORAN: MOHAMMED: MOHAMMEDAN LITERATURE: MOHAMMEDAN SECTS: SHIITES: SUNNA.

MOHAMMEDAN LITERATURE, more correctly Moslem Literature. The oldest specimens of Arabic literature now extant were composed in the century which preceded the birth of Mohammed. They were, for the most part, short extemporaneous elegies written in rhythmical prose, similar to that which we find in the Koran. The appearance of the Koran brought about a change in tone and spirit, and the assertion that it was the uncreated and eternal word of Allah deterred attempts at imitation. But as Moslems, in all ages, have drawn their principles of grammar and rhetoric from the Koran, it must be considered the foundation of Mohammedan literature. (See KORAN.) The English translations of the book are: Sale's (A.D. 1760); Rodwell's, with the suras arranged in chronological order (1861); Palmer's (1880). Arabic commentaries on the Koran form an important branch of Moslem literature. In the library at Tripolis there are not less than 20,000 volumes of these works. The most celebrated are the *Baghawi* (A.H. 515); the *Tafsīr-ul-Kabīr* (A.H. 606); the *Baizāwi* (A.H. 685); and the *Jalalain* (A.H. 864). Among the Shiahs there are many commentaries of reputation, the earliest being that by *Shaikh Saduk* (A.H. 381).

The Traditions (Arabic *Hadīth*, or *Hadīs*, lit. 'a saying').—The Koran is not, as is sometimes asserted, the only foundation of the Moslem religion, for the Prophet propounded the dogma that that which he said and did, and also that which he refrained from saying and doing, on questions of doctrine and rules of life, were the result of divine inspiration and guidance. These have been incorporated in many volumes and are

known as the 'Hadith.' Among the Sunnis there are six volumes called the 'Siha-us-Sittah' or 'six correct' books. Namely, *Bukhāri* (A.H. 256); *Moslem* (A.H. 261); *Tirmizi* (A.H. 279); *Abu Daud* (A.H. 275); *Nasai* (A.H. 303); *Ibn Mājah* (A.H. 273). The Shiahs do not reject the traditions, as is frequently asserted, but they have five collections of their own, namely, the *Kāfi* (A.H. 329); the *Fakīh* (A.H. 381); the *Tahzib* (A.H. 466); the *Istifsār* (A.H. 468); the *Balāgah* (A.H. 406). The Wahhābis, as a rule, reject the traditions (see WAHHABI). When Ismail al-Bukhāri determined to make a careful collection of the traditional acts and sayings of the Prophet he found not fewer than 300,000 extant, from which he selected only 7,275, and it is said that he recorded each of these traditions after making prostrations in prayer and seeking divine guidance. The only English translation of selections from these traditions of the Sunnis is Matthew's translation of the *Mishkāt* (A.D. 1809), a work originally compiled by Baghawi, the celebrated commentator.

Theology.—The theological works embrace many thousands of volumes in Arabic and Persian, for while in the progress of centuries an overwhelming number of theological works were written, they are now sent forth in still greater numbers from the lithographic printing presses of the East. These theological works consist of: 1. Commentaries on the Koran. 2. Commentaries on the Traditions. 3. The exegesis of the Koran and the Traditions. 4. Law, moral, civil, and ceremonial. 5. Scholastic theology founded on the six articles of the Moslem creed. 6. Sufiism, or the mystic teachings of the religious orders. (See SUFI.)

Jurisprudence.—The principles of civil law are very carefully outlined and defined. Among the Sunnis there are four schools of interpretation of civil law, namely, *Hanīfah Shāfii, Mālik,* and *Hambal.* The Hidāyah, which is the standard work of the Sunnis was translated into English by Hamilton (A.D. 1791). There is a Digest of the Hanifia code, and also a Digest of the Imāmeea code by Bailie 1869, and there are other English translations of various sections of the Moslem law, such as inheritance, sale, divorce, etc.

History.—In the 7th c. of the Christian era the Caliph of Islam is said to have destroyed the Alexandrian, and other libraries, but in the middle of the 8th c. the Abbaside caliphs at Kufa, and afterwards at Baghdad became magnificent patrons of literature. When the Moors conquered the cities of the West and came into possession of the richest legacies of intellectual wealth they used them in such a manner as to earn for themselves the most prominent place in history as patrons of learning, for if they did not produce many original works in science, philosophy, and art they certainly had the energy to translate the works of Greece and Rome into what was considered the 'god-sent

tongue' of the Koran, but unfortunately they destroyed the originals. Mansur, the Abbaside caliph (A.H. 136), was a great patron of learning, and Harun-ar-Rashīd (A.H. 170), the hero of the Arabian Knights, surrounded himself with eminent scholars. The reign of Mamun (A.H. 198) has been designated the Augustine period of Mohammedan literature. Baghdad was then the resort of poets, philosophers, and historians of every country and creed. Under the Fatimide caliphs (A.D. 910 to 1171), Egypt, for a second time in its history, became the asylum of literature. Alexandria had more than 20 schools of learning, and Cairo, which was founded A.D. 955, possessed a royal library of 100,000 manuscripts. During the Moslem occupation of Spain, which lasted for 7 centuries, from A.D. 711 to 1492, the cities of Cordova, Seville, and Granada rivalled each other in the reputation of their scholars and in the magnificence of their schools of learning.

Moslem history naturally begins with the life of the Prophet. The earliest historian of the Prophet of whom we have any record is Ibn Ishāk, who died A.H. 151. Other historians of eminence are Ibn Hishām, Ibn Saad, the secretary of Al-Wakidi, and at-Tabri, who flourished in the latter part of the 3d c. of the Moslem era, and who has been styled by Gibbon the 'Livy of the Arabians.' He compiled not only the annals of the Prophet's life but a history of Islam under the earlier caliph. Ibn Husain, of Cordova, wrote a history of Islam, and it is said that his writings contained as many as 160,000 folio pages. The most complete lives of Mohammed in English are by Sprenger (1851), Muir (1858), Margoliouth (1905).

Biography.—Moslem literature is specially rich in biographical dictionaries. They are very numerous, both in Arabic and Persian. The most celebrated is that by Ibn Khallikan, who died A.D. 1282, and which is translated into English by De Slane, 1842. The Kashf-uz-Zunun gives a list of 1,300 chronicles and memoirs.

Logic.—The Mohammedans being suddenly called from the deserts of Arabia to the duties of civilized life found it necessary to reconcile the simplicity of the precepts of their Prophet with their new surroundings, and they were obliged to give the study of dialectics an importance in their religious system. *Ilm-ul-Mantik*, 'the science of rational speech,' was taught and is still taught in all the schools. Hanifah, the head of the great school of jurisprudence, was such a master of logic that Ibn Mālik declared that if he were to assert that a pillar of wood was made of gold he would undoubtedly prove it. Greek works on logic were translated into Arabic by the order of the Caliph Mamun A.H. 198. Arabic treatises on logic have been translated into English by the Bengal Asiatic Society.

Philosophy.—Arabic *falsafah* or *Ilm-ul-Hikmah*. The

philosophy of the Arabians was only a form of Aristotelianism, tempered more or less with Platonic conceptions. Of the Moslem philosophers in the East the most important were Alkendi (*al-Kindi*), *Alfarabi* (*al-Farābi*), who adopted the Neo-Platonic doctrine of emanation, Avicenna (*Abu-Sina*) of Bokhara, the representative of a purer Aristotelianism, and al-Ghazzali, of Naisapur, who maintained a philosophical scepticism in the interests of theological orthodoxy. In the West were Avempace (*Ibn Baja*), Abu Bacer (*Abu Bakr*), and Averroes (*Ibn Rashīd*). Avempace and Abu Bacer dwell in their works on the idea of the independent and gradual development of man. Averroes was a celebrated commentator of Aristotle. (See Ueberweg's *History of Philosophy*, translated into English by Morris.)

Poetry.—The Prophet of Arabia repudiated the idea of being a poet. 'This is not the speech of a poet,' he wrote in the Koran. But poetry has always been a favorite occupation of the Moslem in the East. Scholars classify the Arabic poets into 6 periods, and De Slane in his English introduction to Ibn Khallikan gives an interesting account of the poets of Arabia. The English translation of the Rubiyāt of Omar Khayām is well known, and there are also English translations of other Persian poets, including Hāfiz, Sādi, Firdausi, Nizāmi, Rumi, and Jāmi. (See PERSIA.)

Medicine.—Although the only medicine recommended in the Koran is honey, Moslems have always paid particular attention to the study of medicine, and many of our modern pharmaceutical terms, such as camphor, jalap, and syrup are of Arabic origin. But the superstitious feelings of Moslems debarred them from the study of anatomy and surgery. The doctrine that even at death the soul does not depart from the body, and the popular belief that the body will appear with the soul in Paradise, were reasons why the dissection of the dead body should not be attempted. Operation for cateract in the eye was a Moslem practice, and the philosopher Avecenna wrote in defense of depression instead of extraction. Botany, as a subsidiary to medicine, was studied in the East in all ages, and the Saracens are credited with having discovered several herbal remedies which were not known to the Greeks. The first great Arabic writer on chemistry was Jabar, of Mesopotamia, who lived only a century and a half from the flight of Mohammed, and is credited with the authorship of 500 works, and to have discovered sulphuric and nitric acids. We owe to the Arabs the terms alcohol, alkali, and many other words in chemistry.

Astronomy.—The science of astronomy was necessary for the study of astrology, and was cultivated with great zeal. The Caliph Mamun was an astronomer. But not a single step was made towards the discovery of the solar system beyond the hypothesis of Ptolemy.

The Saracens are said to have been the first to introduce observatories. The one erected by Jabir (A.D. 1196), at Seville, may still be seen.

Geography.—The study of geography was not neglected, and it is said that the royal library at Cairo had two massive globes. But the statements of Moslem writers on geographical discoveries are the creations of Eastern fancy. A circle of mountains called Kāf is supposed to compass the earth and to be inhabited by demons and genii. This mountain range is said to be of emerald which gives an azure hue to the sky!

The Sciences.—There is a very important Arabic work named 'Mafatih-ul-Ulum,' by Abu Abdullah, written somewhere about A.D. 975, which is, as its title indicates, 'the keys of the sciences,' and which in a small compass gives a conspectus of the sciences, both indigenous and foreign, known to the Mohammedans in the 10th c. of the Christian era, including philosophy, logic, medicine, arithmetic, algebra, geometry, astronomy, music, mechanics, alchemy, jurisprudence, history, grammar, and poetry.

Lexicons.—Moslem literature embraces a very large number of Arabic and Persian lexicons. Mr. Lane says that the Sihah, compiled by Jauhari in the 4th c. of the Moslem era, is pre-eminent among the lexicons of the ages. There are two well-known dictionaries in Arabic and Persian, compiled in modern times, and known as the Ghiyas-ul-Lughat and the Muntah-al-Arab. The Arabic and English dictionaries now extant are by Richardson, Lane, Badger, and Steingass, with several smaller works.

For an account of the state of literature in Spain under the Moors the English reader can refer to de Gayango's translation of al Makkara's *History* (London, 1840); *A Literary History of Persia*, by Prof. Browne of Cambridge, (England, 1902); and Gosse's translation of *A History of Arabic Literature*, by Clement Huart (New York, 1903), are most comprehensive.

MOHAM'MEDAN SECTS: divisions among those professing the faith of Islam. 'My community,' Mohammed is reported to have said, 'will separate itself into 73 sects; one only will be saved, all the others shall perish.' This prophecy has been largely fulfilled. Even during the illness, and immediately after the death of the founder, many differences of opinion arose among his earliest adherents. The fundamental book of Islam left certain points undecided by the very fact of its poetical wording (see KORAN: MOHAMMEDANISM); and further, the peculiarity of the Arabic idiom at times allowed many interpretations to be put on one cardinal and dogmatic sentence. To add to this uncertainty, a vast number of oral traditions sprang up and circulated as an expansive corollary to the Koran. Political causes soon came to assist the confusion and contest, and religion

was made the pretext for faction-fights, which in reality had their origin in the ambition of certain men of influence. Thus 'sects' increased in far larger numbers even than the Prophet had foretold, and though their existence was short-lived in most instances, they yet deserve attention, if only as signs and tokens of mental activity, which, though fettered a thousand times by narrow and hard formulas, will break these fetters a thousand times, and prove its everlasting right to freedom of thought and action. These sects are notable as tokens also of the inherently divisive and schismatic effect of theology when it is taken as the substance or the chief aim of a religion.

The bewildering mass of these controversies largely theological or philosophical, has by the Arabic historians been brought under four chief heads or fundamental bases. The first of these relates to the divine attributes and unity. Which of these attributes are essential or eternal? Is the omnipotence of God absolute? If not, what are its limits? The second relates to the doctrine of God's predestination and man's liberty—a question of no small purport, and one which has been controverted in nearly all 'revealed' religions—How far is God's decree influenced by man's own will? How far can God countenance evil? and questions of a similar kind belonging to this province. The third is perhaps the most comprehensive 'basis,' and the one that bears most directly upon practical doctrines—viz., the promises and threats, and the names of God, together with various other questions relating chiefly to faith, repentance, infidelity, and error. The fourth concerns itself with the influence of reason and history on the transcendental realm of faith: To this head belong the mission of prophets, the office of Imam, or Head of the Church, and such intricate subtleties as to what constitutes goodness and badness; how far actions are to be condemned on the ground of reason or the 'Law;' etc.

One broad line, however, came to be drawn, in the course of time, among these innumerable religious divisions, a line that separated them all into orthodox sects and heterodox sects; orthodox being those only who adopted the oral traditions, or Sunna (see SUNNITES).

Much more numerous than the orthodox divisions are the heterodox ones. Immediately after Mohammed's death, and during the early conquests, the contest was chiefly confined to the question of the Imamat. But no sooner were the first days of warfare over, than thinking minds began to direct themselves to a closer examination of the faith itself, for which and through which the world was to be conquered, and to the book which contained it, the Koran. The earliest germs of a religious dissension are found in the revolt of the Kharejites against Ali, in the 37th year of the Hedjrah (A.D. 659); and several doctors shortly afterward broached heterodox opinions about predestination and the good and evil to be ascribed to God. These new doctrines were boldly, and in a very advanced form, openly preached by Wâsil Ibn

Atâ, who, for uttering a moderate opinion in the matter of the 'sinner,' had been expelled from the rigorous school of Basra. He then formed a school of his own—that of the Separatists or Motazilites (q.v.), who, with a number of other 'heretical' groups, are variously counted as one, four, or seven sects.

The second great heretic group, the Sefatians (attributionists) held a precisely contrary view to that of the Motazilites. With them, God's attributes, whether essential or operative, or what they afterward called declarative or historical, i.e., used in historical narration (eyes, face, hand), anthropomorphisms, in fact, were considered eternal. But here, again, lay the germs for more dissensions and more sects in their own body. Some taking this notion of God's attributes in a strictly literal sense, assumed a likeness between God and created things; others giving it a more allegorical interpretation, without, however, entering into any particulars beyond the reiterated doctrine, that God had no companion or similitude. The different sects into which they split were, first, the Asharians, so called from Abul Hasan al Ashari, who, at first a Motazilite, disagreed with his masters on the point of God's being bound to do always that which is best. He became the founder of a new school, which held (1) that God's attributes are to be held distinct from His essence, and that any literal understanding of the words that stand for God's limbs in the Koran is reprehensible. (2) That predestination must be taken in its most literal meaning, i.e., that God preordains everything. The opinions on this point of man's free will are, however, much divided, as indeed to combine a predestination which ordains every act with man's free choice is not easy; and the older authors hold it is well not to inquire too minutely into these things, lest all precepts, both positive and negative, be argued away. The middle path, adopted by the greater number of the doctors, is expressed in this formula: There is neither compulsion nor full liberty, but the way lies between the two; the power and will both being created by God, though the merit or guilt be imputed to man. Regarding mortal sin, it was held by this sect, that if a believer die guilty of it without repentance, he will not, for all that, always remain a denizen of hell: either God will pardon him, or the Prophet will intercede on his behalf, as he says in the Koran: 'My intercession shall be employed for those among my people who shall have been guilty of grievous crimes;' and further, that he in whose heart there is faith but of the weight of an ant, shall be delivered from hell-fire. From this more philosophical opinion, however, departed a number of other Sefatian sects, who, taking the Koranic words more literally, transformed God's attributes into grossly corporeal things, like the Mosshabehites, or Assimilators, who conceived God to be a figure composed of limbs like those of created beings, either of a bodily or spiritual nature, capable of local motion, ascent, or descent, etc. The

notions of some actually went so far as to declare God to be 'hollow from the crown of the head to the breast, and solid from the breast downward; he also had black curled hair.' Another sub-division of this sect were the Jabarians, who deny to man all free agency, and make all his deeds dependent on God. Their name indicates their religious tendency, meaning 'Necessitarians.'

The third principal division of 'heretical sects' is formed by the Kharejites, or 'Rebels' from the lawful prince—i.e., Ali—the first of whom were the 12,000 men who fell away from him after having fought under him at the battle of Seffein, taking offense at his submitting the decision of his right to the caliphate (against Moawiyyah) to arbitration. Their 'heresy' consisted, first, in their holding that any man might be called to the Imamat though he did not belong to the Koreish, nor was even a freeman, provided he was a just and pious man, and fit in every other respect. It also followed that an unrighteous Imam might be deposed, or even put to death; and further, that there was no absolute necessity for any Imam in the world.

For the fourth principal sect, the Shiites, or 'Sectaries,' followers of Ali Ibn Abi Tâleb, see SHIITES.

It remains only to mention a few of the many pseudo-prophets who arose from time to time in the bosom of Islam, drawing adherents around them, and threatening to undermine the church founded by Mohammed, by either declaring themselves his legal successors, or completely renouncing his doctrines. The first, and most prominent, was Mosaylima (q.v.). Next stands Al-Aswad, originally called Aihala, of the tribe of Ans, of which, as well as of that of a number of other tribes, he was governor. He pretended to receive certain revelations from two angels, Sohaik and Shoraik. Certain feats of legerdemain, and a natural eloquence, procured him followers, by whose aid he made himself master of several provinces. A counter-revolution, however, broke out the night before Mohammed's death, and Al-Aswad's head was cut off; whereby an end was put to a rebellion of exactly four months' duration, but already assuming large proportions. In the same year, 11 Hedjrah (A.D. 633), but after Mohammed's death, a man named Toleiha set up as prophet, but with very little success. He, his tribe, and followers were met in open battle by Khalid, at the head of the troops of the Faithful, and being beaten, they all finally submitted to Islam.

A few words ought also to be said regarding the 'Veiled Prophet,' Al-Mokanna, or Borkai, whose real name was Hakim Ibn Hashem or Hakim-ben-Allah (q.v.), at the time of Al-Mohdi, third Abbaside caliph. He used to hide the deformity of his face (he had also but one eye) by a gilded mask; which his followers explained by the splendor of his countenance being too brilliant (like that of Moses) to be borne by ordinary mortals. Being a proficient in jugglery besides, which went for the power of working miracles, he soon drew many followers.

At last he arrogated the office of the Deity itself, which by continual transmigrations from Adam downward, had come to reside in the body of Abu Moslem, governor of Khorassan, whose secretary this new prophet had been. The caliph, finding him growing more and more formidable every day, sent a force against him, which finally drove him back into one of his strongest fortresses, where, as the story is, he first poisoned and then burned all his family; after which he threw himself into the flames, which consumed him completely, except his hair. He had left a message, however, to the effect that he would reappear in the shape of a gray man riding on a gray beast, and many of his followers for many years expected his reappearance. They wore, as a distinguishing mark, nothing but white garments. He died about the middle of the 2d c. Hedjrah.

For the Karmathians and the Ismaïlis, see those titles. We can scarcely enumerate among the prophets Abul Teyeb Ahmed Al-Motanebbi, one of the most celebrated Arabic poets, who mistook, or pretended to mistake, his poetical inspirations for the divine afflatus, and caused several tribes to style him prophet, as his surname indicates, and to acknowledge his mission. The gov. of his province, Lûlû, took the promptest steps to stifle any such pretensions in the bud, by imprisoning him, and making him formally renounce all absurd pretensions to a prophetical office. The poet did so with all speed. He was richly rewarded by the court and many princes for his minstrelsy, to which henceforth he clung exclusively; but the riches he thus accumulated became the cause of his death. Robbers attacked him while he was returning to his home in Kufa, there to live on the treasure bestowed upon him by Adado'ddawla, Sultan of Persia. —The last of these new prophets to be mentioned is Baba, who appeared in Amasia, in Natolia, in 638 Hedjrah (A.D. 1260), and who had immense success, chiefly with the Turkmâns, his own nation, so that at last he found himself at the head of nearly a million men, horse and foot. Their war-cry was, God is God, and Baba—not Mohammed—is his prophet. It was not until both Christians and Mohammedans combined against him for self-defense, that this new and formidable power was annihilated, its armies being routed and put to the sword, while the two chiefs were decapitated by the executioner.

MOHA'VE DESERT: see AMERICA.

MOHAWK, n. *mō'hawk*, or MOHOCK [from an Amer. Indian tribe of that name]: at the beginning of the 18th c., a name applied to a class of ruffians in London who prowled about at night committing outrages.

MO'HAWK RIVER: stream in e. N. Y., named from a tribe of Indians. It rises in Oneida co., and flows eastward into the Hudson at Waterford, 10 m. above Albany. It is 135 m. long, and has numerous and picturesque waterfalls, especially at Little Falls, Cohoes, and Waterford, affording abundant water-power.

MOHAWKS, *mō′hawks*, or MO′HAWK INDIANS: tribe of the Iroquois: see INDIANS, AMERICAN.

MOHICANS, *mō-hē′kanz*, or MOHEGANS, *mō-hē′ganz*, or MAHICANNI: formerly a powerful and warlike subtribe of N. Amer. Indians, of the great Algonquin family, which, in the 17th c., inhabited the territory n.n.w. of Long Island Sound, and e. of the Hudson river, now included in the states of New York, Connecticut, and Massachusetts. Being compelled to give way to the conquering Iroquois confederacy, they retired to the valley of the Housatonic river in Conn., and were consequently one of the first tribes who came into collision with, and were dispossessed of their territory by the early British settlers. They subsequently lived dispersed among the other tribes, and nearly all traces of them have now disappeared. Their name has become widely known through J. Fenimore Cooper's celebrated novel, *The Last of the Mohicans.*

MOHILEV, or MOGILEV, *mo-ḉhē′lĕv:* government of European Russia, between Minsk and Smolensk; 18,500 English sq. m. The inhabitants are mostly Rusniaks, though there are also many Russians, Germans, Jews, and even Bohemians. The country is generally a plain, with occasional undulation; the soil is very fertile, and the climate agreeably mild. Agriculture, arboriculture, and horticulture have been brought to high development. The natural pasturage is of fine quality, and affords abundant nourishment to immense herds of cattle. The forests are extensive. The country is watered by the Dnieper and its numerous affluents, which give communication with the Black Sea ports, and means of transit for corn, timber, and masts, of which last large quantities are annually floated down to Kherson. Bog iron ore is found in abundance. The inhabitants are noted for activity and industry; and M., from its great natural advantages, has now become one of the richest provinces of Russia.

In early times, M. belonged to the territory of the Russian prince of Smolensk, but was conquered by the Grand Duke of Lithuania; and was, with Lithuania, united to the kingdom of Poland. In 1772, it was seized by Russia at the first partition of Poland; and 1796, was joined to the govt. of Vitebsk, under the name *White Russia;* but since 1802, it has formed a separate government. Pop. (1890) 1,387,000; (1897) 1,708,041.

MOHI'LEV, or MOGI'LEV: capital of the govt. of M. in European Russia, and one of the finest towns of Russia; in the centre of the govt., on the right bank of the Dnieper, 100 m. s.w. of Smolensk. It is the seat of a Greek abp., and of the Rom. Cath. primate of Russia and Poland, besides being the favorite residence of many of the Russian nobility. It possesses a fine Greek cathedral, built 1780, 20 Greek, one Lutheran, and 4 Rom. Cath. churches, several synagogues, and a variety of religious, educational, and charitable institutions. Its streets are wide, straight, and well paved, and there is a fine promenade bordered with trees, whence a beautiful view of the valley of the Dnieper is obtained. One-third of the people are Jews. There is large export trade to the chief ports of the Baltic and Black Seas. Pop. (1880) 40,431; (1891) 45,311; (1897) 43,106.

MOHI'LEV, or MOGI'LOW: district town on the s.w. frontier of the govt. of Podolia, Russia; on the left bank of the Dniester, which separates it from the govt. of Bessarabia. It carries on active trade with the adjacent Russian provinces, and to some extent with Galicia and Roumania. The climate is so mild, that silk and other products of warm climates are extensively produced. Pop. (1880) 18,130; (1890) 20,975.

MÖHLER, *mö'lêr*, JOHANN ADAM: distinguished polemical divine of the Rom. Cath. Church: 1796, May 6—1838, Apr. 12; b. Igersheim, Würtemberg; of humble parentage. He received his early education at the Gymnasium of Mergentheim, whence, in his 17th year, he was transferred, for the higher studies, to the Lyceum of Ellwangen; and soon afterward entered on the theological course in the Univ. of Tübingen. He received priest's orders 1819; and for a short time was in missionary duty; but, 1820, he returned to college-life, and was engaged as classical tutor; but, 1822, the offer of a theological appointment in the Univ. of Tübingen, finally decided his choice of the study of divinity, and 1823, he entered on his new position. In 1828 he received the degree doctor of divinity, and was appointed ordinary prof. of theology. His earliest publication was a treatise *On the Unity of the Church* (1825), followed 1827 by a historico-theological essay on *Athanasius and the Church of His Time, in Conflict with Arianism.* But his reputation both contemporary and posthumous, rests mainly on his well-known *Symbolism; or the Doctrinal Differences between Catholics and Protestants, as represented by Their Public Confessions of Faith* (1832). This remarkable book at once fixed the attention of the theological world. It passed through five large editions in six years. It was translated into all the leading languages of Europe, and drew forth numerous criticisms and rejoinders, the most considerable of which is that of Dr. F. C. Baur (q.v.), 1833. To this M. replied 1834, by *Further Researches into the Doctrinal Differences of Catholics and Protestants.* The polemical bitterness evoked by these controversies made it desirable that M. should leave the Univ. of Tüb-

ingen. He was invited to Breslau, also to Bonn, but ultimately selected (1835) the Univ. of Munich, then in the first flush of its efficiency, under King Louis. His first appointment was nominally the chair of biblical exegesis, but he really applied himself to church history, in which his opening course was eminently successful; but, unhappily, a naturally delicate constitution began to give way under the constant fatigues of a student's life; and though he continued, under all these disadvantages, to maintain and to add to his reputation, and though 1837 the invitation to the Bonn professorship was renewed in still more flattering terms, he gradually sank under consumption, and died 1838. His miscellaneous works were collected and published posthumously, 2 vols. 8vo. (1839–40), by his friend, the now celebrated Dr. Döllinger. M. may be regarded as at once the most acute and the most philosophical of the modern controversialists of his church. He deals more, however, with the exposition of the points and the grounds of the doctrinal differences of modern sects, than with the discussion of the scriptural or traditional evidences of the peculiar doctrines of any among them.—M.'s thought was liberal, and his spiritual sympathy wide, and his *Symbolism* is singularly able and suggestive; yet his statement of Rom. Cath. doctrine is not fully accepted by his church; and Protestants consider that his strength was given rather to exposing the inconsistencies of the reformers and the weaknesses of various sects than to a discussion of the Reformation itself as a great movement of religious thought.

MO'HONK LAKE: mountain resort, remarkably picturesque and interesting, including an extensive area around a small lake near the summit of Sky-Top, in the Shawangunk Mountains, Ulster co., N. Y.; 15 m. w. of Poughkeepsie on the Hudson, 6 m. w. from New Paltz (on a branch of West Shore railroad), 88 m. from New York. Like the neighboring resort (9 m. distant), Lake Minnewaska (q.v.), M. L. presents a startling and impressive scene of massive rocks heaped in wonderful confusion, overhanging cliffs, and summits commanding views of six states. There are 35 m. of admirable roads within the estate and an excellent hotel with large accommodations. The lake itself is about half a mile long, and a few hundred ft. wide.

MOHUR, n. *mō'hĕr* [Pers. *muhr*, a gold coin]: a gold coin of British India, equal to 15 or 16 rupees.

MOHURRUM, n. *mō-hŭr'rŭm* [Ar. *Muharram*, sacred, forbidden]: a Mohammedan festival in memory of Hassan and Houssein, nephews of the prophet; the first month of the Mohammedan year.

MOIDORE, n. *moy'dōr* [F. *moidore*, a spelling of the Port. *moeda d'ouro*, money of gold—from L. *monēta*, money; *de*, of; *aurum*, gold]: former gold coin of Portugal, of the value of 4,800 reis, or nearly 27s. sterling (abt. $6.57). It was called also *Lisbonine*.

MOIETY, n. *moy'ĕ-tĭ* [F. *moitié*, half—from L. *medĭĕtātem*, the place in the middle]: the half; one of two equal parts; a part.

MOIL, v. *moyl* [OF. *moiller;* F. *mouiller*, to wet to soak—from a supposed mid. L. *mollĭārĕ*, to soften—from L. *mollis*, soft: It. *mollare*, to soak]: in *OE.*, to wet; to daub with dirt; to pollute; to wallow.

MOIL, v. *moyl* [see MOIL 1, and comp. Gr. *molos*, labor, toil; L. *molĭor*, I toil; Gael. *maille*, slowness, painful effort]: to toil or labor; to drudge. MOIL'ING, imp. MOILED, pp. *moyld.* TOIL AND MOIL, very hard and apparently hopeless labor. *Note.*—MOIL 2 is probably only a secondary application of MOIL 1, from the laborious efforts of one struggling through wet and mud, or from the frequent dirty state of the person who labors hard—see Wedgwood and Skeat.

MOIRE, n. *mwawr* [F. *moire:* formerly *mohère*, supposed from English *mohair*, itself prob. of eastern origin (see MOHAIR)]: clouded or mottled appearance on metallic or textile fabrics; watered or clouded silk; mohair. The silks for moire must be broad and of good substantial make; thin and narrow pieces are not suitable: they are wetted, and then folded with particular care, to insure the threads of the fabric lying all in the same direction, and not crossing each other, except as in the usual way of the web and the warp. The folded pieces of silk are then submitted to enormous pressure, generally in a hydraulic machine. By this pressure, the air is slowly expelled, and in escaping, draws the moisture into curious waved lines, which leave the permanent marking called watering.—The same process has been applied to woolen fabrics called Moreen, which is only an alteration of the word moire. MOIRE-ANTIQUE, superior style of watered silk made to resemble the materials worn in olden times. MOIRE-MÉTALLIQUE, *-mā'tăl-lēk'* [F.]: frosted or crystalline appearance produced for ornamental purposes on tin-plate; the tin-plate thus prepared. This appearance, as of frost on windows, is produced by dipping plates, in a heated state, into nitro-muriatic acid, and then washing with water, to remove the acid. When dry, the plates are varnished or lacquered, and have a pretty effect. The cheapness and ease of the process have made it very common for inferior articles in tin.

MOISSAC, *mwâ-sâk':* town of France, dept. of Tarn-et-Garonne, on the river Tarn, 15 m. n.w. of Montauban. The church of St. Pierre dates from 1100, and contains some excellent carvings and curious fantastic sculptures. M. is the centre of important trade in grain. Pop. 6,000.

MOISSAN, *mwâ-sân,* HENRI: French chemist: b. Paris 1852, Sep. 28; d. 1907, Feb. 20. He was educated at the Museum of Natural History in Paris, and at the School of Pharmacy; taught in the Higher School of Pharmacy 1879-83, and then (1886) became its professor of toxicology. He isolated and liquefied fluorine, thus winning in 1887 the Lacaze prize from the Academy of Sciences; was transferred to the chair of mineral chemistry in the School of Pharmacy in 1889; and there won great fame by his important experiments and achievements with the electric furnace. In 1892 he made the manufacture of acetylene simple and commercially profitable by his discovery that if carbon and lime be fused in the electric furnace pure calcium will be formed, which makes the liberation of acetylene an easy matter. Much more spectacular was his formation of diamonds in 1893; iron was melted in the electric furnace and saturated with carbon; the furnace at a temperature of more than 4,000° C. (that is, more than 7,200° F.) was plunged into cold water; the resulting ingot was attacked with hot aqua regia; the iron was thus dissolved and diamonds were disclosed. Moissan wrote: *L'Isolement de Fluor* (1886); *Réproduction du Diamant* (1893); *Etude complète des Carbones amorphes et des Graphites* (1898), and various articles for Fremy's *Encyclopédie Chimique.*

MOIST, a. *moyst* [OF. *moiste;* Milan. *moisc,* wet, damp: connected with L. *mustĕŭs,* new fresh—from *mustum,* new wine]: damp; wet in a small degree; juicy; containing water or other liquid; in *OE.,* fresh or new. MOIST'NESS, n. *-nĕs,* dampness; a slight degree of wetness. MOISTEN, v. *moys'n,* to wet in a small degree; to damp. MOISTENING, imp. *moys'nĭng.* MOISTENED, pp. *moys'nd.* MOISTENER, n. *moys'nĕr,* he or that which moistens. MOISTURE, n. *moys'tūr* or *-chûr,* a moderate degree of wetness; humidity; dampness. MOIS'TURELESS, a. *-lĕs,* without moisture.

MOKAH, n. *mō'ka* [Turk]: title of a doctor of law in Turkey.

MOKANNA, *mo-kân'na,* or ATHA-BEN-HAKIM. See HAKIM-BEN ALLAH; MOHAMMEDAN SECTS.

MOLAR, n. *mō'lĕr* [L. *molāris,* a millstone—from *mola,* a mill: It. *molare;* F. *molaire,* molar]: a double tooth or grinder: ADJ. grinding; used for grinding, as a *molar* tooth.

MOLASSE, or MOLLASSE, n. *mŏ-lăs'* [F. *mollasse,* flabby, flimsy—from F. *mol;* L. *mollis,* soft]: in *geol.,* extensive Miocene or Middle Tertiary deposit, occupying the central lake-region of Switzerland between the Alps and the Jura. It consists chiefly of a loose sand, but at the foot of the Alps it usually takes the form of a conglomerate called 'Nagel-flue,' which is said to attain the astonishing thickness of 6,000 to 8,000 ft. in the Righi, near Lucerne, and in the Speer, near Wesen. The molasse contains a few shells and some vegetable remains, among which are several palms.

MOLASSES, n. *mō-lăs'ĕz* [F. *mélasse;* It. *melassa*, molasses—from Sp. *melaza*, the dregs of honey, the drainings of sugar: Port. *melaço*, molasses]: liquid which drains from raw sugar during the process of granulation and cooling; treacle: see SUGAR.

MOLAY, *mo-lā'*, JACQUES DE: 1244–1314; b. Burgundy. Nothing is known of his early life, except that he joined the order of Knights Templars, and became grand master about 1298. At that time the former splendid success of the various religious orders had forsaken them. Palestine was again in the power of the Mohammedans, and the Templars had retired to Cyprus, whence they in vain appealed to Europe for aid in reconquering the Holy Land. Then De M. entered into alliance with the Mogul Tartars in their war against Syria and Egypt, commanding one wing of their army, with which he invaded Syria and captured Jerusalem 1299. Next year, however, the Tartars were utterly defeated, and the Templars again driven out of Jerusalem. They retired to the island of Tortosa, near Tripoli; whence, 1302, they were driven to Cyprus. Philip IV. of France, fearing the power and influence of the Templars and Hospitalers, and lusting after their immense wealth, determined on their destruction. Pretending to want to organize another crusade, he summoned the heads of the orders to meet him. De M. landed in s. France at the head of a retinue of 60 chosen knights, and a train of pack-mules laden with treasure. His march through the country, and into Paris, where he arrived 1306, Aug., was like the triumphal procession of a monarch. This only increased Philip's fear and cupidity. Rumors damaging to the Templars had been spread. De M. demanded an investigation from Pope Clement at Poictiers. Formal charges were made, of a heinous nature, to the king, who secretly and simultaneously arrested every Templar in France 1307, Oct. 13. They were charged with denying Christ; adoring an idol; infamous kisses at their initiation; omission of the words of consecration in the mass; and unnatural crimes. Under inhuman torture many of the order confessed these charges to be true; among others De M. is said to have so confessed. The pope at first protested against Philip's arrogant proceeding without his authority; but finally fully sanctioned all. De M. was chained in a dungeon until 1314, when he was burned at the stake on an island of the Seine at Paris, after having declared his former confession false, and his order innocent of the charges made against it. He was the last grand master of the Templars. See TEMPLARS.

MOLD, n. *mōld* [Dut. *mul,* dust; *mullen,* to crumble away: Goth. *mulda,* dust: Icel. *mold,* earth; *molda,* to commit to earth; *molna,* to molder away]: fine soft earth such as constitutes soil; friable earth; garden-soil; earth or material of which anything is formed. MOLDER, v. *mōld'ér,* to turn to dust, or crumble by natural decay; to waste away gradually. MOLD'ERING, imp.: ADJ. turning to dust; wasting or crumbling away. MOLDERED, pp. *mōld'érd:* ADJ. turned to dust; wasted away. MOLDERY, a. *mōld'ér-ĭ,* partaking of the nature of mold. MOLD-BOARD, the broad concave part of a plow which receives and lays over the furrow-slice cut off by the coulter, and raised up by the share. MOLD-WARP, n. *-wawrp* [AS. *molde,* earth; *weorpan,* to throw or cast]: a mole, so named from its casting up earth.

MOLD, n. *mōld* [Bav. *mauckelen,* to smell close and musty; *maunken,* to look sour, to smell ill: Dut. *monckelen,* to look gloomy or sour: Dan. *muggen,* sulky, musty]: the thread-like fungi which form on bodies, particularly when exposed to warm or damp air, and which prey upon them and destroy their original properties (see below): V. to cause to contract mold; to become moldy. MOLD'ING, imp. MOLD'ED, pp. MOLD'Y, a. *-ĭ,* covered with mold. MOLD'INESS, n. *-nĕs,* state of being moldy; the minute fungi which appear on organic bodies under certain conditions. IRON-MOLD: see IRON.

MOLD, n. *mōld* [F. *moule;* OF. *modle;* Sp. *molde,* a mold, a model: It. *modolo,* a model—from L. *modŭlus,* a small measure]: that in which anything is cast and receives its form; shape or bed in which metal and other castings are made; the matrix; a shape for confectionery; the cast or form given; model or pattern from which workmen execute moldings, ornaments, etc.: V. to form into a particular shape; to fashion; to knead. MOLD'ING, imp. (see FOUNDING): N. anything formed in a mold; an ornamental form in wood or stone (see MOLDINGS): the contour given to the angles of cornices, capitals, window-jambs, etc.; a small border or edging to a panel, or to a picture-frame. MOLDING-SAND: sand is used for molding, in preference to all other materials, on account of its refractory nature, which enables it to resist the destructive action of molten metal at high temperatures; on account of its porosity, which allows the free escape of the gases generated in casting; and on account of its peculiarly compact and adhesive properties, which not only permits of its being molded to any desired shape, but also enables it to resist a great amount of pressure exerted by a liquid. The best molding sand is obtained from the coal measures, and the later red sandstone formations. Sand from the green-sand and chalk formations is also very satisfactory. MOLD'ED, pp. MOLD'ABLE, a. *-ā-bl,* that may be molded or formed. MOLD'ER, n. *-ér,* one who molds or forms into shape.

MOLD, *mōld* (anciently *Monte Alto;* Welsh, *Wyddgrug*): parliamentary borough in the county of Flint, Wales, on the Alun, 12 m. w.s.w. of Chester. Though Flint is the county town, the assizes and quarter-sessions for the county are held here. The town possesses a good market, a fine old church, and several dissenting chapels. It is connected with England by a branch of the Chester and Holyhead railway. The neighborhood abounds in mineral wealth, coal and lead being the principal product; it has also numerous interesting relics of antiquity—e.g., so-called Druidic circles, Roman roads and encampments, Saxon earthworks, an eminence called *Bryn Beili* (formerly surmounted by a castle), and a castellated building known as the Tower of Rheinallt ab Gruffydd, the two latter having been scenes of frequent contentions between the English and Welsh. Many old families have mansions in the neighborhood, whose pleasing variety of scenery renders it attractive. Pop. of parliamentary borough about 6,000.

MOLD, or MOLDINESS: common name of many minute fungi which appear, often in crowded multitudes, on animal and vegetable substances, either in a decaying or in a living but morbid state. To the naked eye, they often seem like patches or masses of fine cobweb, and are discovered by the microscope to consist of threads more or less distinctly jointed, sometimes branched. Some species of M. occur on many different substances; others seem peculiar to substances of particular kinds, as decaying pears, decaying gourds, etc. Some of the molds belong to the sub-order of fungi called *Physomycetes:* see FUNGI. One of these is the COMMON M. (*Mucor mucedo*), plentifully found on fruit, paste, preserves, etc., in incipient decay, whose progress it hastens. It consists of cobweb-like masses of threads, from which rise many short stems, each bearing at the top a roundish membranous blackish spore-case.—A nearly allied, also very common species, is *Ascophora mucedo*, which forms a bluish M. on bread. From a spreading cobweb-like bed rise long slender branches, terminated by spore-cases, of which the vesicle collapses into the form of a little *pileus.*—An interesting species of M., remarkable for luxuriance and beauty of colors—at first white, then yellow, with orange spore-cases, then shining green or olive, and with threads often several inches long—grows on fatty substances.—Other species of M. are ranked among *Hyphomycetes*, a sub-order of Fungi, having a floccose thallus and naked spores. One of these is the BLUE M. (*Aspergillus glaucus*), which imparts to cheese a flavor agreeable to epicures, and perhaps marks it as in a condition most suitable for promoting the digestion of other aliments, of which epicures eat too much. Advantange is often taken

Common Mold (*Mucor mucedo*), highly magnified.

of the fact, that a small portion of cheese affected with M. will speedily infect sound cheese into which it may be introduced. It is one of the few cases in which the propagation of these fungi is ever desired and sought after by man.—SNOW M. (*Lanosa nivalis*) is found on grasses, and especially on barley and rye beneath snow, often destroying whole crops. It appears in white patches of a foot or more in diameter, which finally become red as if dusted with red powder.

Even living animals are liable to be injured by fungi of this kind. Silk-worms are killed in great numbers by one called MUSCARDINE (q.v.), or SILKWORM ROT. Such fungi are sometimes developed on the mucous membrane and in internal cavities of vertebrated animals; and on the bodies of invertebrated animals, as the common house-fly, which, in the end of autumn, when it becomes languid, often dies from this cause. Even strongly-scented substances, if moist, are liable to be attacked by M. of one kind or other; nor are strong poisons, either animal or vegetable, a sufficient safeguard. *Ascophora mucedo* springs up readily in paste full of corrosive sublimate; and the mycelium of molds is found in strong arsenical solutions. The only sure preventive of M. is dryness. Many of the molds vegetate in liquids, but do not attain their perfect development, appearing only as filamentous and flocculent mycelia. The *Vinegar Plant* (q.v.) is an instance of this kind.

Mildews and Molds are very nearly allied.

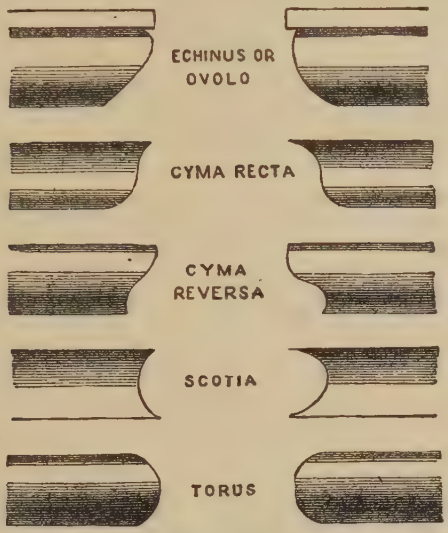
The rapidity with which these fungi are produced is marvellous. 'In favorable circumstances, a plant will pass through every stage of growth to perfect maturation of its seeds in less than two days, the threads which sustain the ripe sporangia being so long, and yet so delicate, as to make it a marvel that they can remain erect.'—(*Berkeley*).

MOLDAU, *mōl'dow* (Bohemian, *Vitava*): chief river of Bohemia, and an important tributary of the Elbe. It rises in the Böhmerwald Mountains, on the s.w. frontier 3,750 ft. above sea-level, and flows s.e. to Hohenfurth, where it bends n. to its confluence with the Elbe opposite Melnik, after a course of 276 m. Its course to the point of confluence is longer than that of the Elbe, and the navigation of that river is greatly facilitated by the body of water which it contributes. It receives on the left, the Wotawa and the Beraun; and on the right, the Luschnitz and the Sazawa. The chief towns on its banks are Krumau, Budweis, and Prague. It becomes navigable from Budweis.

MOLDAVIA, *mŏl-dā'vē-a*, AND WALACHIA, *wŏl-lā' kē-a:* two states forming the so-called *Danubian Principalities*, which, since 1861, Dec. 23, have been united under one prince and one administration: see ROUMANIA.

MOLDER, MOLDERING: see under MOLD 1.

MOLD'INGS: curved and plane surfaces used as ornaments in cornices, panels, arches, etc., and in all enriched apertures in buildings. In classic architecture the M. are few in number, and definitely fixed in their forms.



Classic Moldings.

There are eight kinds of these regular M., viz., the Cyma, the Ovolo (or Echinus), the Talon, the Cavetto, the Torus, the Astragal, the Scotia, and the Fillet (q.v.); and each of these M. has its proper place assigned to it in each order: see COLUMN. In Gothic architecture, and all other styles, the M. are not reduced to a system as in the Greek and Roman styles, but may be used in every variety of form at the pleasure of the artist. Certain forms generally prevail at one period in any style.

Various Moldings.

Thus, in Gothic architecture, the date of a building may in many instances be determined by the form of the M. The Norman M. were very simple in outline, and fre-

quently enriched with the zigzag and billet ornaments. Fig. 1 is a common Norman form.

In the early English style, also, the M. are simple in outline, usually arranged in rectangular divisions, as in fig. 3, and consist of alternate rounds and hollows. In late examples of this style, the fillet was introduced (fig. 2), and led to the more elaborate form of M. during the Decorated period (fig. 4).

The M. of the Perpendicular style are generally flatter and thinner than the preceding, and have large hollows separated by narrow fillets, producing a meagre effect.

Each of these styles has its peculiar ornaments and style of foliage; and when these are used with the M., there is no difficulty in determining the approximate date of a building.

MOLDWARP: see under MOLE 3.

MOLE, n. *mōl* [Ger. *mahl*, a stain, a spot: Goth. *mail*, a mark: Scot. *mail*, a spot in cloth: Sw. *mal*, a mark: L. *macŭla*, a spot or blemish]: spot or permanent mark on some part of the human skin: see NÆVUS.

MOLE, n. *mōl* [F. *mole*, a bank or causeway on the sea-side—from L. *mōlēs*, a huge mass or pile: It. *mole*]: a massive work of stones formed in the sea to protect a harbor from the violence of the waves; a huge shapeless mass.

MOLE, n. *mōl* [Dut. *mol*, a mole: Ger. *maulwerf;* Icel. *moldvarpa*, so named from its habit of casting up little hillocks of mold or earth]: small animal which burrows in the ground and throws up mold or earth (see below). MOLE-BAT, a lumpy sea-fish. MOLE-CAST, a mole-hill. MOLE-EYED, nearly blind. MOLE-HILL, a little hillock thrown up by moles; anything very small, or of infinitely less importance than represented, as, 'to make a mountain of a *mole-hill.* MOLE-TRACK, the underground course of a mole. MOLDWARP, n. *mōld'-wawrp* [OE. *molde*, mold, and *werpen*, to throw up]: in *OE.*, the name of which *mole* is the shortened form.

MOLE, n. *mōl* [L. *mola*, a false conception: It. *mola:* F. *mole*]: in *med.*, a mass of fleshy matter generated in the uterus.

MOLE (*Talpa*): genus of quadrupeds of order *Insectivora*, family *Talpidæ*. All the *Talpidæ* live chiefly underground, and their structure is adapted to their mode of life. In their general form, the character of their fur, the shortness of their limbs, the great muscular strength of the foreparts and great breadth of the forepaws, the elongated head, the elongated and flexible snout, the smallness of the eyes, and the complete concealment of the ears, they all resemble the COMMON M. (*T. Europæa*), with which they nearly agree also in the nature of their food, their mode of seeking it, their dentition, and the shortness of their alimentary canal.—The Common M. is abundant in most parts of Europe, except the utmost north and utmost south. Instead of its or-

dinary uniform black color, it is occasionally found yellowish white, or gray, and even orange. Its silky or velvety fur lies smoothly in every direction, the short hairs growing perpendicularly from the skin—a peculiarity which preserves it clean as the animal moves either forward or backward in its subterranean galleries. The forepaws are not only very broad, but are turned outward, for better throwing back the earth in burrowing: they are terminated by five long and strong claws. The phalangeal bones are remarkable for breadth, and an elongated bone of the carpus gives additional strength to the lower edge of the paw. The two bones of the forearm are fastened together. The shoulder-blades and the clavicles are very large; and the sternum has an elevated ridge as in birds and bats, for the attachment of powerful muscles. The muscles which move the head also are very powerful, and the servical ligament is even strengthened by a peculiar bone; the M. making much use of its flexible snout in burrowing. The hinder limbs are comparatively feeble, and the feet small, with five toes. The eyes are black and very small, capable of being partially retracted and exserted. The senses of hearing, taste, and smell are very strongly developed. The cutting-teeth are very small and sharp; the canines long and sharp; the true molars broad, with many sharp conical elevations. This dentition adapts the animal for feeding not only on worms and grubs, but also on frogs, birds, and small quadrupeds, which accordingly are its occasional prey, though earthworms are its chief food. The M. is excessively voracious; digestion is rapid, and no long interval can be endured between meals, hunger soon ending in death. When pressed by hunger, it will attack and devour even one of its own kind; and its practice is immediately to tear open the belly of any bird or quadruped which it has killed, and, inserting its head, to satiate itself with the blood. In eating earthworms, it skins them with remarkable dexterity. In quest of them, it works its way underground, throwing up the earth in mole-hills; more rarely in the fine nights of summer it seeks them on the surface of the ground, when it is itself liable to be picked up by an owl equally in want of food. The habitation of the M. is of very remarkable construction: a hillock of earth larger than an ordinary mole-hill, and containing two circular galleries, one above the other, with five connecting passages, and a central chamber which has access to the upper gallery by three passages; while about nine passages lead away from the lower gallery in different directions. The end of a passage entering a gallery on one side is never opposite to the end of a passage entering on the other. To afford all facility of escape in case of any alarm, a passage leads at first downward from the central chamber, and then upward again till it joins one of the high-roads which the M. keeps always open, which are formed by pressing the earth till it becomes smooth and compact, and are not marked by any mole-hills thrown up, and

which not only serve for escape when necessary, but lead to those parts of the creature's appropriated domain where the ordinary mining for worms is to be prosecuted. The nest in which the female M. produces her young is not this habitation, but is formed generally under a mole-

Mole (*Talpa Europæa*):
a, vertical section of the habitation of the mole; *b*, plan of ditto.

hill rather larger than usual, where two or three runs meet, and is lined with leaves and other warm materials. The M. breeds both in spring and autumn, and generally produces four or five young at a birth. The attachment of the parent moles seems to be strong, but transitory.

It has been sometimes alleged that moles eat vegetable as well as animal food, and that they are injurious to farmers, by devouring carrots and other roots; but it appears rather that they gnaw roots only when in the way of their mining operations, or perhaps, also, in quest of grubs which they contain. Moles are generally regarded as a pest by farmers and gardeners, owing to the injury which mole-hills do to lawns and pastures, the burying up of young plants, and the disturbance of their roots. But they are certainly of use in the economy of nature in preventing the excessive increase of some other creatures; and probably also contribute to the fertility of some pastures, by the continual tillage which they carry on. Mole-traps of various kinds are in use, which are planted, if the mole-catcher is skilful, in the often-traversed roads of the animals. Mole-catching has long been a distinct trade in Britain. Another species (*T. cæca*) is found in the most southern parts of Europe; very similar to the Common M., but rather smaller, and having the eye always covered by the eyelid, so as to justify Aristotle's statement, that the M. is blind.

The N. Amer. species are Star-nosed M. (*Condylura*) and Shrew M. (*Scalops* and *Scapanus*): they are very

similar to the European Common M. above described: see SHREW MOLE: STAR-NOSE.

Among other *Talpidæ* are the CHANGEABLE M., or CAPE M. (*Chrysochloris Capensis*) of s. Africa, remarkable as the only one of the mammalia that exhibits the splendid metallic reflections frequent in some other classes of animals.

MOLÉ, *mo-lā'*, LOUIS MATTHIEU, Comte: French statesman: 1781, Jan. 24—1855, Nov. 23; b. Paris; descendant of the magistrate, Matthieu M. (1584–1653). His father, pres. of the parliament of Paris, died by guillotine 1794: his mother was daughter of Malesherbes. In 1805, M. published *Essais de Morale et de Politique*, in which he vindicated the govt. of Napoleon I. on the ground of necessity. The attention of the emperor was drawn to him; he was appointed to various offices in succession, and raised to the dignity of a count and to a place in the cabinet. After Napoleon's return from Elba, he refused to subscribe the declaration of the council of state banishing the Bourbons forever from France, and declined to take his seat in the chamber of peers. In 1815, Louis XVIII. made him a peer, and he voted for the death of Ney. In 1817, he was for a short time minister of marine; 1830 he became minister of foreign affairs in Louis Philippe's first cabinet, but only for a short time; 1836 he succeeded Thiers as prime minister. His ministry was very unpopular with the liberal party; and he resigned 1839. In 1840 he was chosen a member of the *Académie Française*, and thereafter took little part in politics. M. was fiercely attacked, unjustly it is now believed, as servile toward the court. He believed in strong government, but favored constitutional liberty.

MOLE-CRICKET (*Gryllotalpa*): genus of insects of the Cricket (q.v.) family (*Achetidæ* or *Gryllidæ*), remarkable for burrowing habits and for the great strength and

Mole-Cricket, and Eggs (*Gryllotalpa vulgaris*).

breadth of the forelegs. The other legs also are large and strong, but of the form usual in the family.—The best-known species (*G. vulgaris*)—common in many parts of Eu-

rope, but very local—is almost 2 in. long; of velvety brown color; the wings, when folded, do not cover much more than one-half of the abdomen, though large when expanded. It uses its forelegs not only for digging burrows in earth, but for cutting through or tearing off the roots of plants which are found in its way. The mole-cricket feeds both on animal and vegetable substances, and often does much injury to crops. The chirping and somewhat musical call of the mole-cricket, produced in the same way as that of the common cricket, is heard chiefly in the end of the spring and beginning of summer, and only in the evening or at night: in parts of England, this sound has gained it the name of *Churworm:* another local English name is *Croaker.*—The female mole-cricket prepares a curious nest, a rounded subterranean cell, about as large as a hen's egg, having a complicated system of winding passages around it and communicating with it. In this cell, she deposits 100 to 400 eggs. The young live for some time in society. They run actively, both in the larva and pupa states. The mole-cricket is very combative, and the victor generally eats the vanquished.—A species of mole-cricket (*G. didactyla*) does great injury to the plantations of sugar-canes in the West Indies.—A curious Indian insect, of closely allied genus (*Schizodactylus monstrosus*), has prodigiously long wings, which, as well as the wing-covers, are rolled into spiral coils at the tips.

MOLECULAR CONSTITUTION OF BODIES: the theory that matter is not strictly homogeneous, but is coarse grained, is now held universally. The 'grains' are termed *molecules,* and are regarded as being of uniform size in the case of any individual substance. The molecules of different substances vary in weight and also, probably, in volume. It follows from this that the passage of a gas to a liquid, or *vice versa,* is not regarded as involving any change in the size of the constituent molecules, but is due to variation in the spaces between the molecules. The facts on which this view of the constitution of bodies is based are very various; they include the dispersion which light undergoes on passing through transparent substances, considerations of surface tension, the difference of electrical potential which occurs when two metals are put in metallic connection, the amount of polarization at the surface of an electrode and an electrolyte, the viscosity and diffusion of gases and their conductivity for heat. This is not the place to attempt to give any details of these investigations; it will suffice to say that they have resulted not merely in furnishing proof that matter has a structure, but in giving limits below which its coarse-grainedness cannot lie. Thus a study of the surface tension of water shows that the range of the molecular forces of the water molecules is about 0.0000000005 in., but the molecules themselves have freedom of movement and can be pressed

more closely together, consequently their diameter must be less than the value given above. The molecules themselves can, of course, be subdivided into atoms by chemical forces, consequently it is necessary to assume a structure for the former. Regarding this very little is known and the various hypotheses which have been put forward have not met with general acceptance. It has been suggested that the atoms are vortex rings in the ether, and it has also been supposed that they are essentially charges of electricity.

MOLECULAR WEIGHT: it is generally agreed that substances consist of separate small particles; these are in a state of rapid vibration which causes them to collide more or less frequently (see MOLECULAR CONSTITUTION OF MATTER). These particles are called *molecules* and the term 'molecular weight' is applied to their relative weight compared with those of hydrogen. The *absolute* weight of a molecule is incredibly small and can only be determined approximately by rather elaborate calculations. The simplest way of finding the molecular weight would, therefore, appear to be to weigh a certain volume of hydrogen and compare its weight with that of an equal volume of other substances. Clearly, however, these other substances must be in a state comparable with that of the hydrogen, i.e., they must be in a gaseous condition and must be under the same conditions of temperature and pressure as those of the hydrogen. In practice, it is found that hydrogen is rather difficult to obtain, preserve and manipulate in a state of purity, consequently, for convenience, the substance, as a gas, is weighed against an equal volume of air. The relative weights of air and hydrogen have been determined with a high degree of accuracy. If the value obtained with air as unity is multiplied by 14.37, we get the relative weight of the gaseous substance as compared with that of hydrogen. Thus, a certain volume of chlorine is found to weigh 2.449 grams, the same volume of air, under similar conditions of temperature and pressure, weighs 1 gram, therefore chlorine is $2.449 \times 14.37 = 35.18$ times heavier than hydrogen. This number, however, cannot be assumed to represent the relative weight of the chlorine molecule unless we know the number of molecules of chlorine and hydrogen present in the volume in question. Here again the absolute number can only be approximated by a somewhat elaborate calculation and we are forced to consider the relative numbers. Unlike liquids and solids, all gases behave essentially alike for changes of temperature and pressure, i.e., they contract and expand to practically the same extent. They diffuse according to a simple law and, when they combine chemically, the volumes of the constituents and of the (gaseous) products bear a very simple numerical ratio, such as 1:1, 1:2; 2:1, 2:3, etc. These and other facts led Avogadro,

in 1811, to suggest the *hypothesis* which bears his name. It may be expressed by saying that, under similar conditions of temperature and pressure, equal volumes of all gases contain the same number of molecules. It is clear that the number must be equal or unequal, and, if unequal, why should the gases behave alike? We are now in a position to understand the process involved in determining the molecular weight. If there are the same number of molecules in equal volumes of chlorine and hydrogen, and if these volumes have the weights 35.18 and 1, respectively, then these figures must represent the relative weights of each chlorine and hydrogen molecule. Other facts must now be considered. If a certain volume of hydrogen, containing an unknown number (x) of molecules, is allowed to combine with an equal volume of chlorine, also containing x molecules (see above), we obtain *two* volumes by hydrochloric acid containing, therefore, $2 \times x$ molecules. Each of these acid molecules, however, contain *some* hydrogen, therefore x molecules of hydrogen have given rise to $2 \times x$ molecules of acid and, consequently, as the result of this chemical change, each of the original hydrogen molecules has been divided into two parts. Of course, the same applies to the chlorine. These subdivisions of the molecules are called *atoms* (q.v.). It is, then, obvious that if we represent the relative weight of the hydrogen molecule by 1 we must represent that of its atom by 0.5. This, however, is inconvenient, so we represent the relative weight of a hydrogen atom by unity and, consequently, the relative weight of its molecule becomes 2. Hence we have the *specific gravity* of chlorine = 2.449 (air = 1); the *density* of chlorine = 35.18, that of air = 14.37 (hydrogen = 1) while the *molecular weight* of chlorine = 70.36 and that of hydrogen = 2. This is often expressed by saying that 'the density of a gas is half its molecular weight.' The method of determining molecular weight described above is fundamental and is termed the *vapor density method.* Some substances furnish apparent exceptions to the rule that the molecular weight of a gas is double its density. One of the most important examples is ammonium chloride. This salt, from its chemical properties, has the formula NH_2Cl_4, with molecular weight $= 14 + 4 + 35.18 = 53.18$. The density of the vapor obtained under ordinary conditions is, however, 13.29 instead of 26.59, as would be expected. Closer study shows that the vapor consists not of ammonium chloride, but of a mixture of equal molecular proportions of ammonia, NH_3, and hydrochloric acid, HCl. These gases, when cooled, reunite to form ammonium chloride. In terms of Avogadro's hypothesis, one volume of ammonium chloride vapor would contain x molecules which are 26.59 times heavier than hydrogen. The same volume of a mixture of hydrochloric acid and ammonia gases would, how-

ever, contain only $\frac{x}{2}$ molecules of each of these substances. The molecule of the former is 18.09, and that of the latter 8.5 times heavier than hydrogen, but the number of molecules of each which is present is only half the number of the original molecules of ammonium chloride, i.e., each fills only half the total volume, the weight of one volume of mixed gases will be $\frac{18.09 + 8.5}{2} = 13.29$, which is the density actually found. Further work has shown that ammonium chloride which has been carefully dried for many weeks gives the normal density when vaporized, showing that when every trace of moisture is excluded the chloride is *not* dissociated into hydrochloric acid and ammonia. The majority of substances which are known cannot have their molecular weight determined by the method described above because, when heated they decompose, before passing into gas. The molecular weights of such bodies are determined usually by the *freezing point* or *boiling point* methods, which are also termed, more correctly, the *cryoscopic* and *ebullioscopic* methods, respectively. It is well known that when one substance is dissolved in another the freezing or solidifying point of the latter is lowered. The fact that sea-water freezes at a lower temperature than fresh water is the most familiar example of this rule. Experiment has shown that the freezing point of a given solvent is lowered to approximately the same extent by dissolving in it different substances in equimolecular proportion. Thus the same effect on the freezing point is produced by 58.5 parts of sodium chloride, NaCl, as by 74.5 parts of potassium chloride, KCl, or 80 parts of ammonium nitrate, NH_4NO_3, etc. The quantities given are proportioned to the molecular weight of these substances. The method having been tested by means of compounds which can be vaporized without decomposition and having been found to be valid is applied to such bodies as the salts mentioned above and to many other substances which cannot be volatilized or which decompose when heated. Even this method is not sufficient for the chemist's purpose, because there are many materials which do not dissolve to a sufficient extent in any solvent at its freezing point. The boiling point method extends the possibility of molecular weight determinations still further. Just as the *freezing point* of a solvent is *lowered*, so its *boiling point* is *raised* by solution in it of equimolecular proportions of substances. A detailed description of these methods of molecular weight determination would, of course, be out of place here. It will suffice to state that the solutions under examination must be very dilute, in order to avoid disturbing influences of various kinds, consequently the changes of temperature which are obtained amount

only to a few tenths of a degree on the thermometer. It is, of course, to be understood that, for any individual substance, a solvent must be selected which is without chemical action upon it.

There are other methods of determining molecular weight, but they are not in general use in consequence of their complexity, because of their limited application, or on account of the experimental difficulties which they involve. For their description and for further details regarding the methods described above, some good book on physical chemistry, such as Walker's *Physical Chemistry,* should be consulted.

MOLECULE, n. *mŏl'ĕ-kūl* [F. *molécule,* a particle of matter or air—from mid. L. *molec'ūla,* a molecule—from L. *mōlēs,* a mass]: minute mass; one of the elementary particles into which all bodies are supposed to be resolvable; the smallest possible part of a body existing in a free state which can be broken up only into atoms of a different nature—thus, 'hydrogen' in a free state exists in pairs of atoms, each pair being called a molecule (see ATOM; ATOMIC THEORY; ATOMIC WEIGHTS; CHEMISTRY; ELEMENTS, CHEMICAL; MATTER; VORTEX). MOLECULAR, a. *mō-lĕk'ū-lĕr,* pertaining to or consisting of molecules. MOLEC'ULAR'ITY, n. *-lăr'ĭ-tĭ,* the state of being molecular; the state of consisting of molecules. MOLECULAR ATTRACTION, that force or power by which the particles or molecules that compose a body are kept together in one mass.

MOLE-RAT (*Spalax* or *Aspalax*): genus of rodent quadrupeds of family *Muridæ,* having teeth almost like those of rats, but in many respects resembling moles—e.g., in general form, shortness of limbs, concealment of ears, smallness or even rudimentary condition of eyes, and burrowing habits—though their food is altogether different, consisting wholly of vegetable substances, chiefly roots. One species (*S. typhlus*) inhabits southern Russia and parts of Asia. It is known also as the *Podolian Marmot, Blind Rat, Slepez, Zemni,* etc. The mole-rat makes tunnels and throws up hillocks like the mole, but its hillocks are much larger.—Another species, in the Malayan archipelago, is as large as a rabbit.—Nearly allied is the COAST RAT or SAND MOLE of South Africa (*Bathyergus maritimus*), also as large as a rabbit, with other species of the same genus, also natives of South Africa, which drive tunnels through the sandy soil, and throw up large hillocks.

MOLE'SKIN AND COR'DUROY: varieties of FUSTIAN (q.v.), which generic term includes also velveteen, velveret, thick-set, thick-set cord, beaverteen, and other stout cotton cloths for men's apparel—a class of goods largely manufactured in Lancashire, England. For the general structure of these fabrics, see FUSTIAN: VELVET. They all are in fact of the nature of velvet, with a *nap* or *pile* on the surface; and most of them are twilled.

When cloth of this kind leaves the loom, its surface is covered with loops like Brussels carpet, and these are cut open with a ripping-knife of peculiar shape, which the operatives learn to use with great dexterity. The hairy and uneven appearance which the cloth acquires in this operation is subsequently improved by the shearing process. The cloth is next steeped in hot water, for riddance of the paste used in dressing the yarn, and is then ready to be passed through the brushing or teaseling machine, which consists of blocks of wood with concave surfaces covered with card-brushes, working forward and backward in a lateral direction against wooden rollers encased in tin-plate, over which the cloth passes. The tin-plate is made rough with the burs of punched holes. In the next operation, the fustian is singed by passing the nap side quickly over a red-hot metal cylinder. The brushing and singeing are repeated three and occasionally four times, to give the cloth a smooth appearance. It is then washed, bleached with chloride of lime, and dyed—usually of some shade of olive, slate, or other quiet color.

The different names given to fustian cloths depend on their degree of fineness and the manner in which they are woven and finished. Thus, smooth kinds, of strong twilled texture, are called *moleskins* when shorn before dyeing, and *beaverteens* when cropped after dyeing. Corduroy, or king's cord, is produced by a peculiar disposition of the pile-threads. In all fustians, there is a warp-and-weft thread, independent of the additional weft-thread forming the pile; but in corduroys, the pile-thread is only 'thrown in' where the corded portions are, and is absent in the narrow spaces between them.

The increased price of cotton, and the introduction of cheap woolen fabrics, have recently much curtailed the use of the various fustian cloths, though they are still largely worn by some classes of mechanics and laborers.

MOLEST, v. *mō-lĕst'* [F. *molester*—from mid. L. *molestārĕ*, to molest: L. *molestus*, troublesome, offensive: It. *molestare*]: to disturb, trouble, or vex; to annoy; to render uneasy. MOLEST'ING, imp. MOLEST'ED, pp. MOLEST'ER, n. *-ĕr*, one who molests. MOLESTATION, n. *mŏl'ĕstā'shŭn*, annoyance; uneasiness given; disturbance: in *Scotch law*, disturbance of the possession of heritage—an action for molestation being the remedy for the trespass. MOLESTFUL, a. *mō-lĕst'fûl*, troublesome.—SYN. of 'molest': to tease; inconvenience; incommode.

MOLESWORTH, *mōlz'worth*, Sir GUILFORD LINDSEY: English civil engineer: b. Milbrook, Hampshire, 1828, May 3. He studied at King's School, Canterbury, and at Putney College of Civil Engineers; was apprentice to the chief engineer of the London & Northwestern railway; was employed at Woolwich arsenal during the Crimean war; went to Ceylon 1859, becoming director-

general of railways there in 1867; and in 1871 was appointed consulting engineer to the government of India. He received decorations for his services in the Afghan and Burma wars, and retired in 1889. He wrote a standard *Pocket-Book of Engineering Formulæ*, various other works on technical subjects, *Imperialism in India* (1885); *Reason and Instinct in Ants* (1886); a prize essay *Silver and Gold* (1891); etc.

MOLESWORTH, Mary Louisa Stewart: English writer of juvenile stories: b. Holland 1842. In 1861 she was married to Major Molesworth of the Royal Dragoons. Her earlier writings were novels under the pen-name 'Ennis Graham'; she wrote her first children's stories about 1875 and gained an immediate success. Her more famous titles are: *Carrots* (1876); *The Green Casket* (1890); *Meg Langholme* (1897); *The Laurel Walk* (1898); *The Grim House* (1899); *This and That; The House That Grew*, and *Peterkin*. Among her later novels are *Hathercourt Rectory; The Red Grange*.

MOLESWORTH, *mōlz'worth*, Sir William, Right Honorable (eighth baronet): English statesman: 1810, May 23—1855, Oct. 22; b. London; lineally descended from an old Cornish family of large possessions (the first baronet was president of the council in Jamaica in the time of Charles II., and subsequently governor of that island). His university career at Cambridge was cut short by his sending (under great provocation) a challenge to his tutor to fight a duel. He continued his education at the University of Edinburgh, and subsequently at a German university. After making the usual tour of Europe, he returned home, and threw himself 1831 into the movement for parliamentary reform. Next year, though only just of age, he was elected member of parliament for Cornwall (East). He sat for Leeds 1837-41, and then remained out of parliament four years. He was the intimate friend of Bentham and James Mill, and was regarded as the parliamentary representative of the 'philosophical radicals.' In 1839, he commenced and carried to completion, at a cost of not less than £6,000, a reprint of the entire miscellaneous and voluminous writings of Hobbes, the 'Philosopher of Malmesbury." The publication did him great disservice in public life, his opponents ascribing to him the freethinking opinions of Hobbes in religion, as well as the philosopher's conclusions in favor of despotic government. In 1845, he was elected for Southwark (which he continued to represent until his death), and entered on a parliamentary career of great energy and usefulness. He was the first to call attention to abuses in the transportation of criminals; and as chairman of a parliamentary committee he brought to light all the horrors of the convict system. He pointed out the maladministration of the colonial office, explained the true principles of colonial self-government, prepared

draught constitutions for remote dependencies, and investigated the true and natural relations between the imperial government and its colonial empire. 1853, Jan., he accepted the office of first commissioner of public works, in the administration of the Earl of Aberdeen; and 1855 the post of secretary of state for the colonies, in that of Viscount Palmerston; but died before he could give proof of his administrative capacity in the latter office. He established the *London Review*, a new quarterly, 1835; and afterward purchased the *Westminster Review*, organ of the 'philosophical radicals.' The two quarterlies were then merged into one, under the title *London and Westminster*.

MOLE-TRACK: See under MOLE 3.

MOLFETTA, *mōl-fĕt'tâ:* city of southern Italy, province of Bari, on the Adriatic, 18 m. n.w. of Bari. The neighborhood yields excellent fruits, especially almonds and oranges, and has extensive olive plantations. Fish abound along the coast. The city contains a magnificent cathedral, and is partly inclosed by walls; it is conjectured that it occupies the site of some early forgotten town, from the numerous vases, urns, and other relics of antiquity found in its vicinity. Pop. 40,000.

MOLIÈRE, *mo-le-är'*, JEAN-BAPTISTE (properly JEAN-BAPTISTE POQUELIN—the name Molière not having been assumed till he went upon the stage): one of the greatest—probably the greatest of all writers of social comedy: 1622, Jan.—1673, Feb. 17; b. Paris; son of Jean Poquelin, upholsterer, who subsequently became a valet-upholsterer to the king. Regarding the boyhood of Molière, almost nothing is known, but his credulous biographers have put together whatever traditionary gossip they could find floating on the breath of society. Voltaire, while recording these *contes populaires*, as he calls them, pronounces them *très-faux*. All that we really are certain of is, that in his 14th year he was sent to the Jesuit *Collége de Clermont* in Paris, where he had for a fellow-student Prince Armand de Conti, and that, on his leaving the collége, he attended for some time the lectures of Gassendi. He was charmed, we are told, by the freedom of thought permitted in speculative science, and, in particular, conceived a great admiration for Lucretius, the Roman poet-philosopher, whom he undertook to translate. Of this translation, only a single passage remains, intercalated in the *Misanthrope* (act ii. scene 4). About 1641, he commenced the study of law; but the statement of Tallemant des Réaux, that he actually ventured into the precincts of theology, is generally rejected. Molière detested priests. So gay, humorous, and sharp-eyed a humanitarian would have felt quite miserable under the restraints of a monkish life. In 1643 he appeared on the stage as member of a company of players, which took the name *Illustre Théâtre*. This

company, of which he was the principal organizer, appeared first at Rouen during the autumn of 1643, and in January of the following year in Paris. It existed until 1645, Aug., when Molière was imprisoned in the Grand Châtelet for its debts. He was released soon after and fled to the provinces, where he organized a troupe of strolling players. For the next 12 years, we can catch only an occasional glimpse of him. He was playing at Albi and Curcusonne 1647, Nantes 1648, at Toulouse 1649, Narbonne 1650, at Lyon 1653 (where his first piece, *L'Etourdi,* comedy of intrigue, was brought out), at Pézénas 1653-4, at Montjullier, Lyon and Narbonne 1655, at Grenoble during the carnival, and at Rouen during the spring and summer of 1658.

During these now obscure peregrinations, he seems, though an industrious actor, to have been also a diligent student. He read Plautus, Terence, Rabelais, and the Italian and Spanish comedies, besides—without which, indeed, all the rest would have been of little avail—making a constant use of as quick eyes as ever glittered in a Frenchman's head. At Paris, by the recommendation of friends he had made in the provinces, among whom was probably Pierre Mignard the punster, Molière got permission to act before the king, who was so highly pleased that he allowed his company to establish itself in the city under the title of the *Troupe de Monsieur,* conveying the idea of a sort of royal patronage. In 1659 Molière brought out *Les Précieuses Ridicules,* the fine satire of which —lapsing at times, however, into caricature—was instantly perceived and relished. *'Courage, courage, Molière!'* an old man is said to have cried on its first representation; *'voilà la bonne comédie.'** The old man was a prophet. Good comedy dated in France from that night. Ménage, the critic, is reported to have said to Chapelain, the poet, as they were going out of the theatre: 'Henceforth (as St. Remi said to Clovis), we must burn what we have worshipped, and worship what we have burned.' In 1660 appeared *Sganarelle, ou le Cocu Imaginaire;* and in 1661, *'L'Ecole des Maris'*—founded partly on the *Adelphi* of Terence, in which Molière completely passes out of the region of farce into that of pure comic satire —and *Les Facheux.* In the following year, Molière married Armande-Grésinde Béjart, either sister or daughter (for it is still undetermined) of Madeleine Béjart, who was an actress of his troupe, with whom he had formerly lived in what the French politely call 'intimate relations.' There is, however, little ground for the revolting calumny freely circulated even in Molière's lifetime regarding his marriage. Although his marriage was an unhappy one, his literary activity continued as brisk as before. Among several pieces belonging to this year, the most celebrated

* The sentence as given by Demarest, Molière's first biographer, is 'Courage, courage, Molière, voilà la bonne comédie.'

MOLIÈRE.

is *L'Ecole des Femmes,* which excited violent indignation among the clergy and the devout, for its supposed caricature of religious mysteries. Molière defended himself with incredible audacity in his *Impromptu de Versailles. Le Tartuffe,* three acts of which were written 1664, was prohibited from being brought on the public stage; but Molière was invited by the king to read *Le Tartuffe* before the papal legate, Chigi, and six weeks later his majesty permitted the three acts then finished to be performed before the Duc d'Orléans at Villers-Cotterets. In 1665, Louis XIV. bestowed a pension of 6,000 livres on Molière's company, which now called itself *Troupe du Roi.* Next year appeared *Le Misanthrope,* most artistic of all his comedies; soon followed by *Le Médecin Malgré Lui.* When *Tartuffe* was at last brought on the stage, 1669, it obtained a superb success. The truth, the variety, the contrast of the characters, the exquisite art in the management of the incidents, the abundance of the sentiments, and the wonderful alternations of feeling—laughter, anger, indignation, tenderness, make this, in the opinion of most critics, Molière's masterpiece. To the same year belongs *L'Avare.* In 1670 appeared *Le Bourgois Gentilhomme,* a pleasant satire on a prevalent vice among wealthy tradesmen in the France of that day—the vulgar ambition to pass for fine gentlemen. Then came *Les Fourberies de Scapin* (1671), followed by *Les Femmes Savantes* (1672), full of admirable passages; and *Le Malade Imaginaire* (1673), the most popular, if not the best of all Molière's comedies. While acting in this piece, he was seized with severe pains, which, however, he managed to conceal from the audience; but on being carried home hemorrhage ensued, and he expired at ten o'clock at night. As Molière had died in a state of excommunication, and without having received the last aids of religion—which, however, he had implored—the archbishop of Paris refused to let him be buried in consecrated ground; but the king interfered—a compromise was effected, and he was privately interred in the cemetery of St. Joseph, being followed to the tomb, as a letter said to be by an eye-witness declares, by 'no procession, except three ecclesiastics, four priests who bore the body, * * * six children in blue, who carried candles in silver holders, and * * * lackeys with burning torches of wax. * * * There was a great crowd.' The place where the body lies is unknown. In 1792 Molière's supposed remains were transferred to the Museum of French Monuments, whence they were removed to Père-la-Chaise 1817; but the tomb that was opened appears not to have been that of Molière. In his private character Molière was gentle, generous, and agreeable.—Among the best editions of Molière's works are those of Auger (1819-25), Aimé-Martin (1833-6), Moland (1871). and Despois and Mesnard (1873 *et seq.*). A complete but indifferent English translation of Molière's works is

that by Van Laun, 6 vols. (Edin. 1875-6). The best French biographies are by Taschereau (1825-7) and Paul Mesnard (1889). See the excellent *Bibliographie Molièresque* of Paul Lacroix (1875). English biographies are: *The Life of Molière,* by Henry M. Trollope (London and New York 1905), and *Molière,* a biography by H. C. Chatfield-Taylor (New York 1906, London 1907).

MOLINA, *mo-lē'nâ,* LUIS: Spanish Jesuit theologian: 1535-1600, Oct. 12; b. Cuença, in New Castile. He entered the Jesuit Society in his 18th year, studied at Coimbra, and was appointed professor of moral theology at Evora, where he taught for 20 years. He died at Madrid. Molina's celebrity is mainly confined to the theological schools. His principal writings are a commentary on the *Summa* of St. Thomas (Cuença, 2 vols. 1593); a minute and comprehensive treatise *On Justice and Right* (Cuença, 6 vols. 1592; reprinted Mainz 1659); and the celebrated treatise, *The Reconciliation of Grace and Free-will,* Lisbon 1588, with appendix 1589. To the last-named work mainly Molina's celebrity is due.—See MOLINISM.

MOLINARI, *mō-lē-nâ-rē,* GUSTAVE DE: Belgian political economist: b. Liège, Belgium, 1819, Mar. 3. He studied medicine and became a homœopathic physician in Brussels, but later he entered journalism in Paris. His radicalism compelled him to return to Belgium upon the accession of Napoleon III., and he became professor of political economy in the Musée Royal d'Industrie Belge. In 1881 he returned to Paris and edited the *Journal des Economiste* and later founded the journals *L'Economiste Belge* and *La Bourse du Travail.* Among his books are: *Etudes économiques* (1846); *Cours d'Economie politique* (1861); *L'Evolution économique* (1880); *Comment se resoudra la question sociale* (1896); etc.

MOLINE, *mō-lēn':* Ill., city in Rock Island county; on the Mississippi river, and on the Chicago, R. I. & P., the Chicago, B. & Q., and the Chicago, M. & St. P. railroads; about three miles east of Rock Island, nearly opposite Davenport, Ia., and about 155 miles west of Chicago. In the part of the river between Moline and Davenport is an island from which to the shore have been built dams to secure water-power. Moline has good water-power, which is utilized in developing the manufacturing industries. The extensive coal fields in the near vicinity contribute to the industrial development of the city. The chief manufactures are wagons, carriages, agricultural machinery, steel, foundry and machine-shop products, steam engines, saw- and planing-mill products, pumps, paper, flour, and dairy products. Some of the prominent buildings are a library building, which cost $50,000, a city hospital, several fine church and school buildings. The city library was founded in 1892 and contains about 10,000 volumes. There is a good library connected with the high school. The city owns and operates the waterworks. Pop. (1900) 17,248.

MOLINELLA, *mō-lē-nĕl′lâ:* town of Italy, province of Bologna, about 30 m. n.e. of the city of Bologna. The first houses were on islands in the Po, but with the gradual change of the river to its present bed, and the union of the islands, M. has grown in importance. It carries on hemp manufacture, and is a centre of the cheese trade. The buildings are substantial, and the river-side, which was the original location of the town, is now several m. distant. Pop. about 11,000.

MOLINISM, n. *mō′lĭn-ĭzm:* in Rom. Cath. doctrine, system taught by Luis Molina (q.v.), Spanish Jesuit, concerning Divine grace and predestination. MOLINIST, follower of the system taught by Molina.—*Molinism* deals with a problem almost as old as the origin of human thought. It had already led, in the 4th c.; to the well-known PELAGIAN CONTROVERSY (see PELAGINS). In reconciling with the freedom of man's will God's predestination of the elect to happiness, and of the reprobate to punishment, M. asserts that the predestination is consequent on God's foreknowledge of the free determination of man's will; therefore, that it in no way affects the freedom of the particular actions, in requital of which man is predestined whether to punishment or to reward. God, in M.'s view, gives to all men sufficient grace whereby to live virtuously and merit happiness. Certain individuals freely co-operate with this grace; certain others resist it. God foresees each course, and this foreknowledge is the foundation of one or of the other decree. This exposition, which somewhat resembles that of Arminianism (see ARMINIUS, JACOBUS) in Protestantism, was probably in accord with the prevalent feeling in the Rom. Cath. Church at that time, and was commended by its antagonism to the teachings of some prominent Prot. reformers. But it was at once assailed in the schools on two grounds—first, as a revival of the Pelagian heresy, inasmuch as it appears to place the efficacy of grace in the consent of man's will, and thus to recognize a natural power in man to elicit supernatural acts; second, as setting aside altogether what the Scriptures represent as the special election of the predestined, by making each individual, according as he freely accepts or refuses the grace offered to all in common, the arbiter of his own predestination or reprobation. Hence arose the famous dispute between the MOLINISTS and the THOMISTS. It was first brought under the cognizance of the inquisitor-gen. of Spain, by whom it was referred to Pope Clement VIII. This pontiff, 1598, appointed the celebrated congregation, *De Auxiliis*, to consider the entire question; but notwithstanding many long discussions, no decision was arrived at during the life-time of Clement; and though the congregation was continued under Paul V., the only result was a decree, 1607, permitting both opinions to be taught by their respective advocates, and prohibiting each party from accusing its adversaries of heresy. Also attempts were made to bring under control the publication of commentaries on Thomas Aquinas.

The dispute, in some of its leading features, was revived in the Jansenist controversy (see JANSEN, CORNELIUS); but with this striking difference, that whereas the rigorous Jansenists denied the freedom of the will when acted on by efficacious grace, all the disputants in the scholastic controversy—even the Thomists—maintain that, in all circumstances, the will remains free, though they may fail to explain how this freedom is secured under the action of efficacious grace. See AQUINAS. —M. has been commonly taught in the Jesuit schools; but a modification of it was introduced by the celebrated Spanish divine, Suarez (q.v.), in order to save the doctrine of *special election.* Suarez held, that though God gives to all men grace absolutely sufficient for their salvation, yet he gives to the elect a grace which is not alone in itself sufficient, but which is so attempered to their disposition, their opportunities, and other circumstances, that they infallibly, though yet quite freely, yield to its influence. This modification of Molina's system is called CONGRUISM. M. must not be confounded either with Pelagianism or semi-Pelagianism, inasmuch as M. distinctly supposes the inability of man to do any supernatural act without God's GRACE (q.v.).

MOLINO DEL REY, *mō-lē′nō dĕl rā*, BATTLE OF: brilliant engagement in the Mexican war. The massive structures from which the battle received its name were of stone and had been used successively as flour-mills and foundries, when Santa Anna employed them as a fortress from which to defend the castle of Chapultepec, half-a-mile distant and six m. from the city of Mexico. The U. S. forces, about 10,000 men, had won the battles of Contreras and Churubusco, and were near the castle of Chapultepec, when an armistice was arranged and a commissioner of the U. S. govt. endeavored to effect a settlement of the difficulties with the Mexican authorities. His efforts proving ineffectual, hostilities were resumed; and 1847, Sep. 8, the Americans attacked M., which, after a desperate resistance by a force superior in numbers, surrendered the same day. This battle had an important bearing on the future of the war, as it opened the way to the speedy capture of Chapultepec and to the occupation of the city of Mexico by U. S. troops.

MOLINOS, *mo-lē′nōs*, MIGUEL DE: Spanish Rom. Cath. priest, advocate of a phase of Quietism (see QUIETISTS): 1627, Dec. 21—abt. 1696; b. Patacina, Aragon; of noble parentage. He received holy orders and was educated at Pampeluna, and afterward at Coimbra, at which univ. he obtained his theological degree. After gaining distinction in his native country, M. went to Rome, where he soon acquired high reputation as a director of conscience and a master of the spiritual life. His private character was in keeping with this reputation. He steadily declined all ecclesiastical preferment, and confined himself entirely to his duties in the confessional and in

the direction of souls. An ascetical treatise which he published, *The Spiritual Guide*, added largely to the popularity which he had acquired in his personal relations: but there were not wanting many who, in the visionary principles of this work, discerned what they deemed the seeds of a seductive error. Among these, the celebrated preacher, F. Segneri, was the first who ventured publicly to call them into question; but his strictures were by the friends of M. ascribed to jealousy of the influence which M. had acquired with the people. By degrees, however, reports unfavorable to the practical results of this teaching, and even to the personal conduct and character of M., or of his followers, began to find circulation; and eventually, 1685, he was cited before the Holy Office, and submitted to close imprisonment and examination. In addition to the opinions contained in his book, a prodigious mass of papers and letters, to the number, it is said, of 20,000, found in his house, were produced against him, and he was himself rigorously examined as to his opinions. The result of the trial was a solemn condemnation of 68 propositions, partly extracted from his *Spiritual Guide*, partly, it appears, drawn from his papers or his personal professions. These doctrines M. was required publicly to abjure, and he was sentenced to close imprisonment, in which he is believed to have been detained until his death. The opinions imputed to M. may be described as an exaggeration of the most visionary and enthusiastic principles of QUIETISM (see QUIETISTS). According to the propositions condemned by the Inquisition, M. pushed to such an extreme the contemplative repose which is the common characteristic of Quietism, as to teach the utter indifference of the soul, in a state of perfect contemplation, to all external things, and its entire independence of the outer world, even of the actions of the very body which it animates; whence it was logically inferred that he taught that this internal perfection is even compatible with the worst external excesses. These consequences are not openly avowed in *The Spiritual Guide*, but they appear deducible in some sort from some of its maxims, and the accusation was that they were plainly contained in the papers of M., produced at his trial. The report was that they were even admitted by himself. It is to be considered, however, that visionary or dangerous as his extreme views may have been, they would at least have been sufficiently commended to the detestation of his Jesuit opposers by their emphasis on the inward rather than on the outward; by M.'s disregard of external mortifications; and by his advice to monks and nuns to lay aside images and relics of saints, in order to worship God in spirit and in the quietness of the inmost soul. After the death of M., no further trace of his teaching appears in Italy, but it was revived in more than one form in France.—See John Bigelow's *Molinos, the Quietist* (N. Y. 1882).

MOLISE, *mo-lē'sā:* former province of Italy: see CAMPOBASSO.

MOLLAH, n. *mŏl'lä* [Ar. *maula;* Turk. *molla*—from *walai*, to rule]: among the Turks, title of a superior order of judges. The Mollahs are divided into two classes: the first class—four in number, from whom the Mollahs at the court of the Padishah are elected—possesses jurisdiction over the more important pashaliks (Adrianople, Brusa, Damascus, Cairo); and the second—holding their office for only a lunar month at a time, and the lowest rank of whom is formed by the naibs—over the inferior provinces, towns, and villages. The M. is an expounder of civil and criminal law, and of the religion of the state; he is therefore necessarily both lawyer and ecclesiastic. Under him is the Cadi or judge, who administers the law, and superior to him are the Kadhiasker and the Mufti (q.v.). They all are subject to the Sheikh Al Islam or supreme Mufti. In Persia, the office of M. is similar to what it is in Turkey; but his superior is there the 'Sadr,' or chief of the Mollahs. In the states of Turkestan, the Mollahs have the whole government in their hands.

MOLLASSE': see MOLASSE.

MOLLE, n. *mŏl'lē* [L. neut. sing. of *mollis*, soft]: in *mus.*, term applied in mediæval music to B flat as opposed to B natural, which was called B durum. Hence, the term came to signify major and minor mode, as in the German, e.g., A dur, the key of A major; A moll, the key of A minor. Hence, too, the French formed the word bémol, a flat.

MOLLIENT, a. *mŏl'lĭ-ĕnt* [L. *mollĭens* or *mollĭen'tem*, softening—from *mollis*, soft]: serving to soften; assuaging. MOL'LIENTLY, ad. *-lĭ.* See EMOLLIENT, under EMOLLIATE.

MÖLLER, *möl'lĕr*, HENRY: 1749–1829, Sep. 16; b. Hamburg: Lutheran clergyman. He emigrated to the United States 1763; was taken into the family of the Rev. Henry M. Muhlenberg, D.D., in Philadelphia; became a teacher in the latter's school; applied his leisure to studying theol.; and was licensed to preach by the Evang. Lutheran synod of Pennsylvania. Prior to the revolutionary war, he passed his time among the poor, expounding the principles of his faith and gathering the people into congregations; and through the war he served as chaplain of a German regt. in the American army. Subsequently he held pastorates in Reading, Philadelphia, and Albany, and erected the first Lutheran church in the latter city. He preached at New Holland, Penn., 1788–95, Harrisburg 1795–1803, Albany 1803–09, and afterward was in charge of the Lutheran churches at Sharon and New Rhinebeck, N. Y.

MOLLIFY, v. *mŏl'lĭ-fī* [F. *mollifier*—from mid. L. *mollĭfĭcārĕ:* It. *mollificare*, to render soft or supple, to mollify—from L. *mollis*, soft; *fīō*, I become]: to calm; to pacify; to soften; to mitigate. MOL'LIFYING, imp.: ADJ. softening; mitigating. MOL'LIFIED, pp. *fīd*. MOL'LIFIER, n. *-fī-ĕr*, one who or that which softens or appeases. MOL'LIFI'ABLE, a. *-ā-bl*, that may be softened; capable of being mollified. MOL'LIFICA'TION, n. *-fĭ-kā'shŭn*, the act of mollifying; the state of being mollified. —SYN. of 'mollify': to assuage; appease; quiet; qualify.

MOLLITIES, n. *mō-lĭsh'ĭ-ēz* [L. *mollĭtĭēs*, softness]: in *med.*, a diseased softening of an organ, or part of an organ. MOLLITIES OSSEUM, or OSTEOMALAKIA, an obscure disease of the nutritive cells of the bones, which renders them soft, fragile, and unable to sustain the weight of the muscles. In the progress of the disease, the various earthy substances which give strength to healthy bones are diverted from their proper use and to a great extent are eliminated from the system through the action of the kidneys. The diseased bones consist largely of gelatine and are easily bent; their extremities become enlarged, and fractures which do not readily heal frequently occur. After death the bones are soft, light, and brittle, and of a color between red and brown, but when thoroughly dried they become transparent. Frequently cavities are found. These are filled in some cases with an oily fluid, in others they contain clear serum. Some investigators regard this as the result of the conversion of the bony substance into medullary matter; others look upon it as a malignant formation. In the majority of cases all the bones are affected, but those of the head sometimes escape. In its first appearance the disease resembles rheumatism, but it can soon be distinguished by the excessive quantity of phosphatic matter in the urine. It is very painful and the patient becomes unable to either stand or sit erect. It seldom attacks a person under 20 years of age, and a large proportion of its subjects are females. Owing to the diseased condition of the organs of nutrition and assimilation, the natural method of supplying the system with the phosphates and other substances which are deficient in the bones is of no avail. Tonics in the first stages, and stimulants, with opiates to produce sleep, in later stages, are the ordinary remedies, but the disease—fortunately rare—usually advances to a fatal termination.

MOLLUS'CA: one of the great phyla or subkingdoms of the animal kingdom, forming a well-characterized and on the whole homogeneous group of the invertebrate division of Zoology. The M. are placed by most zoologists between the worms and the arthropods (crustaceous insects). By some they are considered an offshoot of the worms, and there is, in some respects, a strong similarity in the developmental history of the two subkingdoms. The M. are somewhat related to the Vertebrata through the Cephalopoda, where the brain is protected by a cartilaginous covering and the eye and nervous system are highly developed. In 1748 Linnæus placed the shell-bearing Mollusca in his third order of his class Vermes and called them Testacea, while the naked M. were placed in his second order, called Zoophyta. In 1758 he changed the name Zoophyta to Mollusca, though this group consisted principally of animals not true Mollusca. The term Mollusca was first definitely applied to this group of animals by George Cuvier, in 1788, but included also the Brachiopoda (lamp-shells), the Ascidians (Tunicata) and the Cirripedia (barnacles). The latter group was removed from the M. in 1830 by J. Vaughan Thompson, who proved their close relationship with the Crustacea. In 1866 a Russian embryologist named Kowalewsky demonstrated the relationship of the Tunicata with the Vertebrata. From 1830 to 1882 the Brachiopoda were studied by various investigators, who demonstrated their relationship with the Polyzoa (sea-mats); they are now included in the subkingdom Molluscoidea.

As now restricted the M. embraces a wonderfully homogeneous group of the animal kingdom, characterized by unsegmented bilaterally symmetrical bodies; the symmetry in some groups, however, being obscured or lost by a torsion or twisting of the body to form a spiral. The body of the mollusk is very soft and fleshy, whence their name, derived from the Latin word Mollis. A hard, calcareous shell or exoskeleton is present in the majority of M. and is developed from a shell gland which is always present in the larval M. The soft body of the animal is closely molded to the shell, to which it is attached by one or more muscles. The shell serves as a means of protection to the soft body of the animal which may usually be withdrawn completely within it. The M. are further distinguished by the presence of mucous glands which secrete a peculiar slimy fluid which covers the body of the animal and which, in the land snails particularly, appears as a glistening, sticky track when the snail crawls over the surface of any object. The creature is covered with a tough skin or mantle, upon the surface of which the shell is formed by means of certain epithelial cells which secrete carbonate of lime (calcite or aragonite). The shell increases in size by the addition of new matter to the outer margin of the shell. On account of the presence of this testaceous shell in the majority of Mollusca the group

often bears the name of *Testacea.* In many of the M., the shell is composed of a single piece, usually a spiral tube closed at one end, and gradually increasing in size toward the open extremity from which the animal is able to protrude itself. Shells of this description are commonly called *univalves.* In others, the shell is composed of two pieces or valves, attached to each other at one point by a hinge furnished with an elastic ligament that serves to open the valves, when it is not opposed by the action of the *adductor* muscles, whose office it is to keep the shell closed. Shells of this kind are termed *bivalves.* These differences in the character of the shell correspond with differences in the conformation of the animals inhabiting them. The bivalve M. exhibit no traces of a head, and hence are termed *Acephalous* M.; while the univalves have a distinct head, provided with organs of the special senses; hence, by way of distinction, some writers have termed them *Cephalophora* (or head-bearing). The shell of a third group of M., the Chitons, is composed of eight pieces or valves. Shells of this kind have hence been popularly caled *multivalves.* Many M. are altogether unprovided with a shell, or have only a small calcareous plate embedded within the mantle. These are termed *naked* M. Many univalves are provided with a horny or calcareous *operculum* which is attached to the foot and which closes the aperture of the shell when the animal withdraws into it. It is worthy of notice that the young mollusk, while still in the egg, is almost always furnished with a delicate pellucid shell, even when it is ultimately to be naked, in which case the embryonic shell is cast off soon after the animal makes its escape from the egg. For the mode of formation, etc., of the shell see SHELL.

Locomotion in many of the M. is executed by means of a muscular structure developed in the middle of the ventral surface of the body, and termed the *foot.* In some (the Gastropoda) the foot forms a sort of flattened disk by the alternate contraction and expansion of different parts of which the animal can slowly crawl forward; while in others (the free-moving bivalves) it is a tongue-like organ, which can be protruded between the valves and with which the mollusk ploughs its way through the sand or mud. In some pelecypods the foot, by its sudden extension, after being previously bent upon itself, enables its possessor (the common cockle, e.g.) to take considerable leaps. The foot is also the agent by means of which certain species burrow in the sand or mud, and others bore into the solid rock. Many M., however, are firmly attached to a single spot, except during their larval state; and as they do not require a foot, we find it either altogether undeveloped (as in the oyster), or serving to support a glandular organ, from which filaments of silky or horny matter (called the *byssus*) are secreted, which serve to attach the animal (the common mussel, e.g.) to rocks, stones, etc. beneath the water. Many of the

M. present modes of locomotion altogether independent of a foot; some bivalves possess a branchial or respiratory chamber, into which water is drawn, and again expelled by muscular action, a recoil being thus produced which serves to drive the animal through the water; the *Pteropoda* (q.v.), furnished with a pair of broad flattened fins (which are processes of a modified foot) at the sides of the head, by means of which they swim with moderate rapidity; the Heteropoda, in which the foot becomes a vertical compound fin, and the Cephalopoda, in which the posterior part of the body is provided with a pair of fins in addition to the funnel or tube through which water is violently ejected to force them in a backward direction. In this class the head is surmounted by a circle of arms or tentacles, which serve as organs of locomotion as well as organs of prehension for the capture of prey.

Fig. 1.—Nervous system of the Aplysia, a Gastropodous Mollusk.

c, cerebral ganglia; *g*, pedal ganglia; *o*, nervous collar surrounding the esophagus; *l*, labial ganglia; *v*, visceral ganglion.

The nervous system is composed of at least three pairs of nerve centers or ganglia, the cerebral, the pleural and the pedal. These three ganglia, frequently with others, as abdominal, visceral, buccal, etc., form a ring or collar surrounding the œsophagus and are connected by nerve fibres called commissures. These ganglia send off nerves which innervate all parts of the body. The cerebral, pedal and pleural ganglia are usually placed in the anterior end of the animal, but the other ganglia may be variously placed, accordingly as the commissures are long or short looped. In some spiral M. the commissures connecting the ganglia have formed a loop or figure-of-eight by the twisting of the snail in its growth. In bilaterally symmetrical M. the commissures run parallel. The cerebral and visceral ganglia are sometimes called super-œsophageal, as they lie above the œsophagus and are connected with the pedal ganglia which lie below the œsophagus. The supra-œsophageal ganglia furnish the nerves to the special organs of the senses. Most of the M. possess special *organs of touch* in the form of lips or of special lobes around the mouth; of tentacles upon the head, or of cirrhi upon other parts of the body; and in addition to these special organs, the skin appears to possess considerable sensibility.

When tentacles are present they are two or four in number. In the land snails, which possess tentacular organs, they may be retracted or protruded at pleasure, as may be seen by examining the eye tentacles or peduncles of the common snail. True organs of sight are present in the Gastropoda and Cephalopoda; in the latter they are placed at each side of the head, while in the former they are situated either on the head or on the tentacles or eye peduncles. In many of the Pelecypoda eye-like structures are developed on the edge of the mantle (e.g., Pecten, Cardium, Spondylus). In the Chitons numerous eyes or oceili are formed on the leathery girdle which surrounds the valves of the shell.

Organs of hearing, in a simple form, are almost always present. They consist usually of round vesicles in the neighborhood of the æsophageal ring, from which they receive a nervous filament. They contain a clear fluid

Fig. 2.—Anatomy of the Snail:

a, the mouth; *bb*, foot; *c*, anus; *dd*, lung; *e*, stomach, covered above by the salivary glands; *ff*, intestine; *g*, liver; *h*, heart; *i*, aorta; *j*, gastric artery; *l*, hepatic artery; *k*, artery of the foot; *mm*, abdominal cavity, supplying the place of a venous sinus; *nn*, irregular canal in communication with the abdominal cavity, and carrying the blood to the lung; *oo*, vessel carrying the blood from the lung to the heart.

and a small concretion of carbonate of lime (Otocyst) which is sometimes roundish, and sometimes of crystalline form, and is in a perpetual state of vibration, in consequence of ciliary action in the interior of the vesicle. Organs of smell and taste in the M., are believed to be present in Spengal's olfactory organ (Osphradium) which is placed at the base of the gill.

The organs of digestion are much more fully developed in the M. than in the lower invertebrates. The alimentary canal which is usually a well-formed intestine, is always provided with two distinct openings, a mouth and an anus, the latter often (as in the Gastropoda and Pteropoda) on the right side of the anterior part of the body. In all groups excepting the Pelecypoda (clams, oysters, etc.) the mouth is provided with a peculiar armature enclosed in a rounded, muscular sac; this consists of one or more horny jaws placed on the upper wall of the œsophagus and a belt or strap of chitinous material, called the radula,

odontophore or tooth-bearer, upon which are placed many minute teeth or denticles, arranged in longitudinal rows. This radula or tongue is placed on the floor of the radula and by a rasping movement cuts off small particles of food. This organ is characteristic of and peculiar to all M. excepting the Pelecypoda. The number of teeth vary from 16 to over 10,000. The mouth, with the radula, may be placed at the end of a more or less retractile proboscis or rostrum, or it may be placed directly in the lower plane of the head. A stomach is universally present and may be simple or multiple, and may also be accompanied by a gizzard which may contain several solid, calcareous

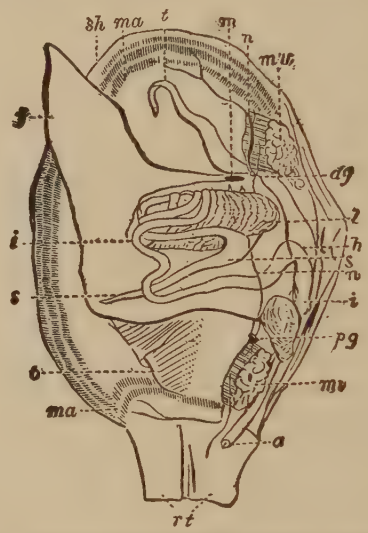


Fig. 3—Anatomy of an Acephalous Mollusk (*Mactra*):
m, mouth; *s*, stomach; *ii*, intestine; *ag*, anterior ganglia; *pg*, posterior ganglia; *mu*, adductor muscles; *a*, anus; *h*, heart; *l*, liver; *f*, foot; *sh*, shell; *ma*, mantle; *b*, branchiæ; *t*, tentacula or Cabial palpi; *r*, oral, or respiratory siphon; *t*, anal siphon.

bodies for the grinding of food particles. The liver is always present, constituting a large part of the body in the acephalous bivalve M. (as the mussel and cockle), and a still larger part in the Gasteropoda (as the snail), while in the Cephalopoda it is constructed on nearly the same plan as in fishes. Other secreting organs, such as salivary glands, pancreas, and urinary organs, also are present in the more highly developed Mollusca.

The circulation of the blood is effected by means of a distinct heart, which is aided by one or two auricles and usually communicates with a regular, closed vascular system; but in some cases the venous system is imperfect, and the blood which has been transmitted by the arteries

to the system in general is not confined within distinct vessels, but meanders through sinuses or passages excavated in the tissues, and through them it reaches the respiratory apparatus, whence it is transmitted by closed vessels (veins) to the heart. The blood is usually colorless (sometimes of light blue or green tint), and red in some snails (planorbis) and contains but few floating corpuscles. In all M., there is a distinct respiratory apparatus, which, excepting in the case of the terrestrial Gastropoda and the aquatic pulmonates (e.g., the snail), is constructed with a view to aquatic respiration, and is composed of *branchiæ*, or gills.

In some of the Pelecypoda the gills consist of a number of membranous plates (arranged like the teeth of a comb) over which the water flows. In the Gastropoda the gills or lamellæ are feather-like and are usually placed in a gill cavity inside the mantle; in some M. (the Nudibranchiates) they project from the back of the snail and are branched or feather-like. In spiral snails the twisting of the body has caused the loss of the left gill, the right gill remaining and generally occupying a median position in the respiratory cavity, which is plentifully supplied with blood-vessels. In some M. respiration takes place over the entire surface of the body. In many of the bivalves, the openings for ingress and egress of water are prolonged into tubes or siphons, sometimes of considerable length; the tube through which the water enters being termed the branchial siphon, while that through which it escapes is termed the *anal* siphon (see fig. 3). In the majority of the aquatic M., except the Cephalopoda, the renewal of the water in contact with the surface of the gills is due mainly to ciliary action. In the air-breathing gasteropodous M. (of which the snails and slugs are well-known examples), there is a pulmonary sac or bag, into which the air penetrates by an opening on the right side of the body near the neck.

There are considerable differences in the modes of *propagation* of the Mollusca.

In the majority of the Pelecypoda, or bivalve M., the sexes are distinct, although organs of copulation are not present. In the Gastropoda (snails) the sexes are usually separate; in the sea-slugs, land-snails and sea-butterflies they are united (hermaphrodites) although mutual impregnation is necessary. In the Cephalopoda the sexes are distinct. The species which have the sexes separate are called diœcious, while the hermaphroditic species are called monœcious. A few M. are said to be capable of self impregnation. The eggs vary greatly in form; in some cases, they are laid separately, but usually they are agglutinated together in a mass; while in some marine species many eggs are inclosed in a leathery capsule, while numerous capsules are united to form a large mass. The eggs of many land-snails are provided with a calcareous shell.

A few M. are ovaviviparous and bring forth their young alive, the young being retained in the oviduct until the extrusion of the young animals. Most M. pass through several peculiar larval stages, called the *trochosphere* and *veliger*. Even the attached forms (oysters, Vermetus) are free when young and swim about by means of peculiar lobes called vela. In the Unionidæ (fresh-water mussels) the larva, called a glochidium, is retained for a time in the gills of the female, which are modified to form marsupia.

The M. exhibit a rather wide variation in form, as may be seen by comparing an oyster, a snail and a devil-fish, although presenting, as stated above, a remarkable homogeneity. They are adapted to many different modes of life, some living on the land in deep valleys or on high mountains; in deserts or in the depths of the forest; some living in fresh water, others in brackish water and others in the sea; they are abundant along the tide-washed shore and extend from the littoral region, which is laid bare by the ebb of the tide, to the abyssal depths of the ocean; the rushing mountain stream has its Molluscan inhabitants, as well as the still depths of the pond and lake. Many M. are carnivorous, while others are vegetable feeders. In size the M. vary from tiny snail shells, one twenty-fifth of an inch in length, to the great clam (Tridacna gigas) of the Pacific and Indian Oceans, which measures more than a yard in diameter and weighs several hundred pounds. The M. are widely diffused through space and are found in every latitude of the earth. The Arctic species are usually whitish or uniform in color, while the inhabitants of the tropics present the most beautiful variation in color. It is difficult to estimate the number of M. at present known. According to the latest authorities there are over 30,000 living species.

The uses of many species of M. for food are well known; and as bait for fishing, mussels and some other M. are of great value.

Many M. which secrete a nacreous or pearly shell are used for ornaments and particularly for the manufacture of pearl buttons. In ancient times a species of marine snail (Murex) furnished the famous Tyrian purple dye.

The animals of this subkingdom are divisible into five classes, as follows: Class 1, *Pelecypoda* or Lamellibranchiate; examples, *clams, oysters, cockles, mussels.* Class 2, *Scaphopoda* or tooth-shells; example, *Dentalium.* Class 3, *Amphineura*, the coat-of-mail shells; example, *Chiton.* Class 4, *Gastropoda;* examples, *snail, cowry, limpet, doris.* Class 5, *Cephalopoda;* examples, *cuttle-fish, nautilus, devil-fish.* The pelecypods have been classified as Acephala (headless), and the other four groups have been united under the name Cephalophora. The terms Aglossa and Glossophora have been employed for these two assemblages, accordingly as the radula or teeth are absent or present. The Pteropoda are believed to be a degenerate group, closely allied to the ancestor of the Gastropoda.

See ZOOLOGY; also the separate titles of the various classes.

The literature of this subject is very extensive, and includes Cuvier, *Mémoires pour servir à l'Histoire et à l'Anatomie des Mollusques* (Paris 1817, 4to); Lamarck, *Hist. Nat. des Animaux sans Vertèbres*, 2d ed., by Deshayes and Milne-Edwards (11 vols. 8vo); Woodward, *Manual of the Mollusca;* and the third vol. (by Keferstein) of Bronn's great work, *Classen und Ordnungen des Thierreichs;* Huxley, *Morphology of Cephalous M.;* Hanley, *Molluscous Animals and their Shells* (4 vols. 8 vo); Gosse, *A Manual of Marine Zoology for the British Isles;* and Alder and Hancock, *Nudibranchiate Mollusca* (published by the Ray Society).

Adams, H. & A., *The Genera of Recent Mollusca;* Tryon, *Structural and Systematic Conchology* (2 vols.); Fischer, *Manual de Conchyliologie;* Pilsbry, Tryon's *Manual of Conchology* (25 vols.); *Guide to the Study of Helices;* Dall, *Tertiary Mollusks of Florida;* Zittel, *Text-book of Paleontology;* Binney, *Land and Fresh-water Shells of North America; A Manual of American Land Shells;* Lea, *Observations on the Genus Unio;* Taylor, *A Monograph of the Land and Fresh-water Mollusca of the British Isles;* Moquin-Tandon, *Histoire Naturelle des Mollusques de France*; E. Ray Lankester, *Article Mollusca* in the Encyclopedia Britannica. Consult also the various papers of Adams, Baker, Bartsch, Binney, Dall, Gould, Jeffreys, Kuster, Lacaze-Duthiers, Martinii and Chemnitz, Owen, Pfeiffer, Pilsbry, Prime, Simpson, Sowerby, Stearns, Sterki, Tryon, Walker, etc.

Fossil Mollusca.—The hard shells of most M. fit them for long preservation, and make them the most frequent organic remains in the fossiliferous rocks from the Ordoircian upward. The nudibranchiate gastropods, having no hard parts that could be preserved, are without fossil representatives. The Cephalopoda, Gastropoda and Pelecypoda have existed together from the earliest period. The tetrabranchiate Cephalopoda were developed in great profusion and variety in the Paleozoic and Mesozoic eras; and as they decreased, the dibranchiate group took their place, and continued to increase in numbers until it reached its greatest development in the seas of our own day. Of the chambered shells, like the pearly nautilus, it is estimated that over 7,500 species are known, of which only five or six exist in the ocean at the present time; the cuttle-fishes and squids, on the other hand, are represented in the Mesozoic and Tertiary rocks by about 200 species, while over 300 are known as living species.

The living Gastropoda exceed the fossil in the proportion of about 5 to 4. This disproportion will appear greater when we remember that the fauna of the present seas is set against the faunas of some 25 different periods, yet it must not be forgotten that we can never be acquainted with more than a fraction of the entire animal life of any bygone age. Almost contemporaneous with the first living organisms, this group has gone on increasing

to the present time, when the numbers are so great that more than 20,000 living species have been recorded.

About 700 fossil Pulmonates are known. The oldest occur rarely in the Devonian and Carboniferous strata. They increase in the Jurassic and Cretaceous rocks, become widely distributed in the Tertiary strata, and reach their maximum development in the present period, there being more than 6,000 species known.

The Pelecypoda have been gradually increasing in numbers and importance from the earliest period, and they attain their maximum development in the existing seas. They are very rare in the Cambrian period, rare in the Ordovician period, and do not become a dominant feature until late Silurian and Devonian time. The number of species gradually increases throughout Mesozoic and Tertiary times. The recent species number about 6,000 and the fossil species a somewhat larger number.

The Scaphopoda appear doubtfully in Silurian strata. They are common in Mesozoic and Tertiary strata and attain their maximum numbers in existing seas.

The Amphineura first appear in Ordovician strata and steadily increase in numbers until the present time. About 80 fossil species and several hundred recent species are known.

MOLLUSCOIDA, n. plu. *möl'lŭs-koy'dă* [Eng. *mollusca*, and Gr. *eidos*, appearance]: one of the two great divisions of the sub-kingdom *Mollusca*, often compound, lower in structure than the true mollusks, and which may have shelly or horny coverings; the *Molluscoida* comprise the three classes, *Polyzoa*, *Tunicata*, and *Brachiopoda:* see MOLLUSCA: INVERTEBRATE (INVERTEBRATA).

MOLLUSK, or MOLLUSC, n. *möl'lŭsk*, MOL'LUSKS, n. plu. *-lŭsks* [F. *mollusque*, a mollusk—from L. *molluscus*, soft—from *mollis*, soft: comp. *mollusca*, a nut with a soft shell; *molluscum*, a species of fungus growing on the maple-tree]: one of a class of animals whose bodies are soft and destitute of a bony skeleton, as snails, oysters, and shell-fish in general. MOLLUSCA, n. plu. *möl-lŭs'kă*, one of Cuvier's grand divisions of the animal kingdom which includes all the shell-fish proper (see above). MOLLUSCAN, a. *möl-lŭs'kăn*, or MOLLUS'COUS, a. *-kŭs*, pertaining to or resembling the mollusca. MOLLUSKITE, n. *möl-lŭs'kīt*, in *geol.*, a dark-brown carbonaceous substance occurring in shelly marbles, originating from the transmutation to mineral of the soft bodies of the mollusca. MOLLUS'CUM, n. *-kŭm*, in *pathol.*, a skin disease, consisting of one or more small tumors, from the size of a pea to that of a pigeon's egg. There is a true molluscum, which is contagious, and a false, which is non-contagious.

MOLLWITZ, *Möl'vĭtz:* village of Prussian Silesia, govt. of Breslau, seven m. w. of Brieg. Pop. 619.—East of it lies the celebrated battle-field where Frederick II. of Prussia gained his first victory over the Austrians under

Marshal Neipperg, 1741, Apr. 10. According to the usual account Frederick, on seeing his right wing and centre thrown into confusion and routed, put spurs to his charger, and fled from the field; but the advance of three battalions of Prussian infantry stopped the Austrians, while by this time Marshal Schwerin, who commanded on the Prussian left, routed the Austrian right wing, and compelled the whole to retreat. The immediate result of this victory was an alliance between France and Prussia, to dissolve which Austria was compelled to surrender Silesia to Frederick 1742.

MOLLY MAGUIRES, *mŏl'lĭ ma-gwīrz':* name of a secret order comprising several thousand anthracite coal miners in n.e. Penn., mainly foreigners; believed to have been formed about 1854, and but little known till 1875, when they began committing murder and other outrages on mining and railroad officers. James McFarlan, a detective, succeeded in gaining admission to the order, by initiation, and obtained information concerning the members and their deeds of violence; and on his testimony the leaders were arrested. An exciting trial followed, a number of the prisoners were condemned, and were hung (1877) by squads and on separate days, and the order disbanded.

MO'LOCH: genus of saurian reptiles, of family *Agamidæ* (see AGAMA). *M. horridus,* an Australian species, is perhaps the most ugly and repulsive in appearance of all the saurian tribes. The whole surface of the body is covered with irregular plates and strong sharp spines; the upper surface of the head is crowned with two very large spines; and on the back of the neck are large rounded protuberances, covered with granular scales and spines. The moloch is, however, entirely inoffensive.

MOLOCH, n. *mō'lŏk* (more correctly MOLECH), also MILKOM, MALKOM (*their* king) [from Heb. *Melech,* king]: the chief Ammonite deity (the Chemosh of the Moabites —see MOABITES), whose worship consisted chiefly of human sacrifices, purifications, and ordeals by fire, mutilation, perpetual virginity, and the like. The name Moloch was originally not so much the name of an individual deity as an honorable title indicating the supreme god of all gods. In the abominable heathen corruption of Israelitish worship, Moloch (sometimes Baal, 'lord,' as a synonym) was the object of worship. Rabbinical tradition represents Moloch as a human figure of brass or clay, with a crowned bull's head, upon whose extended arms were laid the doomed children. A fire within the hollow statue soon scorched them to death, while their shrieks of agony were deadened by a loud noise made by the priests on various instruments. But though this description nearly coincides with that of the statue of the Carthaginian Kronos, and though so late a traveller even as

Benjamin de Tudela speaks of having seen the remains of an ancient Ammonite temple at Gebal, with the fragments of an idol somewhat corresponding to the above representation, yet nothing certain is known about this point at present. The weight of evidence is against identification of M. with Kronos or Saturn, though the two forms of worship may have been cognate; and the offering of children by fire to M. was, as far as appears, not after the Carthaginian manner above noted, but the children, like animals offered, were first slain and then burned on the altar. The worship of M., in whatever shape it may have been, was common throughout the Canaanite nations. The Carthaginians, through whom it was probably spread over the whole East, worshipped Kronos in rites of fire and bloodshed; and human beings, children or grown-up persons, prisoners or virgins, were, either on certain periodical festivals, or on sudden emergencies, offered up throughout almost all the lands and islands which the merchant-people of antiquity may be supposed to have touched at. The description of the Kronian statue, as given by classical writers, differs only in that small respect from the one given above, that the child fell, according to the former, from the hands of the god into a burning fire below, instead of being slowly burned to death. For fire-worship in general, which is the main idea of 'Moloch,' see GUEBRES; though there is no sufficient ground for identifying M. as a form of the sun-god. The name itself gives no clue to its special nature, nor does any comparison with cognate roots lead any further. Molech, or Melech, is the supreme king or deity of the people, who have enthroned him as their tutelary god. Naturally, the princes of Ammon are the princes of *Malcham* = their (the Ammonites') king or god, and his priests were high in social rank.

Respecting the special history of this worship among the Israelites, we can only say that, though we do not see any more reason to presuppose its wide spread at early times (on account of the frequent occurrence of the word 'king' in doubtful passages), than there is the slightest ground for assuming (as has been done by Daumer and others) that the whole Mosaic religion originated in a Moloch-service (a notion which hardly required a serious refutation)—yet there is no doubt that Moloch worship had its secret, though few adherents, even before the Canaanite women in Solomon's harem reintroduced it publicly. The Valley of Hinnom and the Mount of Olives were the chief places of these abominable rites; the former being afterward adopted as the name for Hell, even in Islam. Not until the time of Josiah was this horrible idolatry rooted out from among the people. The word has now become a figurative designation for a kind of irresistible dread influence, at whose shrine everything would be sacrificed, even as the deluded father offered his own child to the terrible idol.

MOLOGA, *mo-lo'gâ:* dist. town in the w. of the govt. of Jaroslav, European Russia, near the confluence of the Mologa and Volga, 68 m. w.n.w. of Jaroslav. It is a town of great antiquity, and belonged first to the principality of Rostof, afterward to Yaroslaf, but 1321–1471 it had its own princes. There was formerly an extensive fair at M. The timber-trade, and the carriage of goods by river-boats and rafts, now occupy the majority of the inhabitants. Pop. (1890) 6,885.—The river Mologa is one of the links between the Volga and the Neva.

MOLOKA'NI: Russo-Greek sect: see MALAKANES.

MOLOSSUS, n. *mŏ-lŏs'sŭs* [Gr. *Molossos*, belonging to the Molossians, in Epirus]: in *Gr. verse*, a metrical verse consisting of three long syllables.

MOLTEN, a. *mōl'tn* [pp. of MELT, which see]: made of metal by melting.

MOLTKE, *mōlt'kéh*, HELLMUTH, Count VON: 1800, Oct. 26—1891, Apr. 24; b. Mecklenburg, long the seat of his family: field-marshal of the German army He was chief of the general staff, and planned the Prussian campaign of 1866 against Austria, and the German campaign of 1870–1 against France. Soon after his birth, his father, a military officer, left Mecklenburg, and acquired an estate in Holstein. He and his brother were sent to the military acad. in Copenhagen, where iron discipline and military frugality laid the foundation of his later character. In 1822, he entered the Prussian army as cornet. His parents having by this time lost all their fortune, he was left without any pecuniary means, and had to undergo many hardships to maintain himself in his position—the pay of the Prussian officers being very small; yet he managed to save enough to take lessons in modern languages, which afterward proved of great advantage. His eminent abilities soon procured him a place in the general staff. 1835–39, he was in Turkey and Asia Minor, whither he was sent by the Prussian govt. to report on the war between that country and Mehemet Ali. Several anonymous publications of his, descriptive of the country and the war, are noticeable. After his return, he rapidly advanced through the different stages to the rank of general, continuing, however, on the general staff. His wonderful strategical powers were of immense service in the wars with Denmark (1863–4), Austria (1866), and France (1870–1); bringing them all to triumphant issues. At the end of the Austrian war he was rewarded with the order of the Black Eagle, 1870 he was created a count, and 1871 he was raised to the rank of field-marshal. He published a work on the Franco-German war; and *Letters from Russia* (1881, but written many years before in his early manhood). M. was a man of great modesty and simplicity; reserved, and little given to talk. See GERMANY: also Müller's *Life of M.*, trans. by Pinkerton (1879).

MOLUCCAS, *mō-lŭk'kaz*, THE, or ROYAL ISLANDS, properly (as distinguished from the M. or SPICE ISLANDS), the islands Ternate, Tidore, Makian, Motir, and Batjan, lying w. of Gilolo, and washed by the Moluccas Strait or Passage, which separates Gilolo from Celebes.—Ternate, the most important, is a volcanic mountain with plains at its base. The top is in 0° 48′ 30″ n. lat., and 127° 26′ 30″ e. long.; area, 33½ sq. m. Pop. 8,594, of whom 109 are Europeans. The town is on the e. side and contains the sultan's palace, the Dutch residency, Prot. church, govt. school, etc. The island is fertile and well watered; the natives peaceful. They cultivate rice, cotton, tobacco, etc., trade with the adjacent islands, and build vessels, from the light skiff and the tent-boat to the war-galley of 60 or 80 rowers, carrying two or more pieces of light artillery.—Tidore is s. of Ternate, its n. point being 1° 11′ n. lat., and 126° 7′ e. long.; area, 33 sq. m. Pop. 8,500. The island is a volcano, 5,532 ft. high, and fertile for 3,000 ft. The natives are less gentle, but more industrious than those of Ternate, and diligently cultivate the soil, weave, and fish. They are Mohammedans, and have many mosques. The sultans of Ternate and Tidore are subsidized by and subject to the Netherlands, exercising their authority under the surveillance of the Resident.—Makian lies in 0° 18′ 30″ n. lat., and 127° 24′ e. long., is very fertile, yields much sago, rice, tobacco, canary-oil, etc., and has important fishings. Pop. 5,000. The natives are industrious, make good nets, spin yarns, and weave coarse striped fabrics.—Further n., in 0° 28′ n. lat., and 127° 29′ 30″ e. long., is Motir, which formerly yielded a considerable quantity of cloves, and later sent much earthenware to all the Spice Islands.

Batjan, the only remaining Royal Island, lies between 0° 13′—0° 55′ s. lat., and 127° 22′—128° e. long.; 50 m. in length and 18 in breadth; has many mountain peaks 1,500 to 4,000 ft. in height, the sources of numerous streams. The greatest part of this beautiful island is covered with ebony, satin-wood, and other valuable timber trees, which give shelter to numerous beautiful-plumaged birds, deer, wild hogs, and reptiles. Sago, rice, cocoanuts, cloves, fish, and fowls are plentiful, and a little coffee is cultivated. Coal is abundant, gold and copper are in small quantities. The inhabitants, numbering 1,800, are lazy and sensual, a mixed race of Portuguese, Spaniards, Dutch, and natives. These islands all are volcanic, Ternate being a mountain, sloping upward to 5,563 ft., to which Tidore bears a striking resemblance. Makian is an active volcano, which, so late as 1861, Dec., threw forth immense quantities of lava and ashes, by which 326 lives were lost, and 15 villages in part or in whole destroyed. Motir is a trachyte mountain, 2,296 ft. in height; and Batjan, a chain with several lofty peaks. Total pop. of the M. proper, 25,000.

South-w. of Batjan is the Obi group, consisting of Obi Major, Obi Minor, Typha, Gonoma, Pisang, and Maya, of which Obi Major, 1° 35′ s. lat., and 127° to 128° e. long.,

is by far the largest, 598 sq. m. It is hilly and fertile, being covered, like the smaller islands of the group, with sago and nutmeg trees. The islands of this group are uninhabited, and serve as lurking-places for pirates and escaped convicts. In 1671, the Dutch built a block-house, called the Bril; and a few years later, the sultan of Batjan sold the group to them for $800; but the station being found unhealthful, the company abandoned it 1738.

The MOLUCCAS, or SPICE ISLANDS, in the broad use of the term, lie e. of Celebes, scattered over nearly 11 degrees of lat. and long., 3° s.—8° n. lat., and 126°—135° e. long., including all the territories formerly ruled by the sultans of Ternate and Tidore. They comprise all the islands of the E. Indian archipelago, between Celebes on the w., the Papuan Islands and New Guinea on the e., Timor on the s., and the open Pacific on the n.; abt. 450 m. from e. to w., and 800 m. from n. to s. They are divided into the residencies of Amboyna (q.v.), Banda (q.v.), and Ternate; a fourth residency being Menado (q.v.). Over the n. groups of the Spice Islands, the Netherlands exercise an indirect government, the sultans of Ternate and Tidore being required to have all their appointments of native officials ratified by the resident. The s. groups are directly under European rule. The residency of Amboyna contains that island, sometimes called Ley-Timor, or Hitu (from the two peninsulas of which it is formed), Buru, the Uliassers group, and the w. part of Ceram. That of Banda includes the Banda, Keffing, Key, Arru, and other islands, also the e. portion of Ceram. Under the residency of Ternate are placed the M. proper, Gilolo, the neighboring islands, and the n.w. of Papua. Pop of the M. and dependencies, about 5,000 Europeans and 800,000 natives.

Amboyna, the Banda and Uliasser Islands, chiefly supply the cloves, nutmegs, and mace which form the staple exports. The Banda Islands are Neira or Banda-Neira, Great Banda, Ay or Way, Rhun, Rozingain, and Goenong-Api; 588 sq. m. Pop. 7,000, of whom 500 are Europeans; that of the whole residency 150,000, including the e. part of Ceram. The principal island of the group is Neira, s.e. from Amboyna, 4° 33′ s. lat., and 130° e. long., separated by narrow straits from Goenong-Api on the w., and Great Banda on the east. The coast is steep, and surmounted by several forts and batteries, which command the straits and roadstead. The town of Neira, on the s. side of the island, is cap. of the Dutch residency of Banda, has a Prot. church, school, and hospital. The Banda Islands have rich soil, and are planted with nutmeg-trees, which produce in one year more than a million lbs. of nuts, and near 300,000 lbs. of mace. The culture has nearly doubled since 1851. Pine-apples, the vine, banana, cocoa-nut, and other fruit-trees thrive, and are abundant. Ay is the prettiest and most productive of the group. Goenong-Api is a lofty volcano. There are wild cows, hogs, and deer; sea-carp and mackerel,

which last are dried, and form with sago the food of the slaves. The e. monsoon begins in May, and the w. in Dec., and are accompanied with rain and storms. The climate is not very healthful.

The Uliassers, which, with Amboyna, produce the cloves of commerce, are Saparoua, Oma or Haroukou, and Nousa-Laut. They lie e. of Amboyna, 3° 40′ s. lat., and 128° 33′ e. long.; 107½ sq. m. Saparoua is the largest, and is formed of two mountainous peninsulas, joined in the middle by a narrow strip of undulating grassy land. Recently there were about 100,000 trees producing 185,000 lbs. of cloves. Pop. 11,665, of whom 7,340 are Christians, and have 12 schools, with very large attendance of scholars.—Oma, separated from Saparoua by a strait of a league in width, has 11 villages, of which Harouka and Oma are chief. It is mountainous in the s., and has several rivers and sulphurous springs. The produce of cloves has amounted in one year to 40,000 lbs.; and the villagers possess 50,000 cocoa palms, besides other fruit-trees. The woods abound with deer and wild hogs, the rivers with fish. Sago is grown, but not in sufficient quantities to meet the wants of the people, who draw further supplies from Ceram. The beautiful village of Harouka, on the w. coast, is the residence of the Dutch postholder, who is pres. of the council of chiefs. Here is the head office of the clove-produce. There are two forts on Oma, several churches, and six schools, with 700 pupils. Pop. 7,500, one-half Christians, the other Mohammedans.—Nousa-Laut lies s.e. of Saparoua. It is planted with clove-trees, which in one year produced 120,000 lbs. There are more than 30,000 cocoanut-trees. Pop. 3,479, formerly pirates and cannibals, all now Christians, with schools in every village—attended (1859) by 870 pupils.

The clove-tree and the nutmeg are indigenous to all the Spice Islands, but the clove-cultivation is confined to Amboyna and the Uliassers, the nutmeg to the Banda Islands. Till 1824, the Dutch prohibited the planting of these trees in other parts, and caused those of native growth to be rooted out, in order to prevent smuggling, and to retain the supply of these spices to the European market. The Spice Islands are generally healthful both for Europeans and for Asiatics; and though the plains are sometimes very hot, mountains are always near, where it is pleasantly cool in the mornings and evenings. Besides the spice-trees, the bread-fruit, sago, cocoa-nut, banana, orange, guava, papaw, also ebony, iron-wood, and other valuable timber-trees, are abundant. The natives of some of the islands are Alfoers; of others, Malays on the coasts, and Alfoers in the interior. In Ceram are also Papuan negroes, brought originally from Bali and Papua as slaves.

The resident and other Dutch officials reside in the city of Amboyna, the streets of which intersect at right angles, are broad, and planted with rows of beautiful trees: see AMBOYNA.

The native inhabitants of the Moluccas in the wider sense, belong to two or three different stocks, now much intermingled, Malays, Papuans, perhaps also Polynesians. There are numerous descendants of the early Portuguese settlers, known as *Orangsirani*, i.e., Nazarenes, and speaking a language compounded of Malay and Portuguese. They are now mostly Protestants. Slavery has introduced numerous foreign elements into the population. Everywhere Chinese are found; and often Arab merchants, having native wives. A great volcanic belt passes through the Moluccas and gives them their distinctive character; but many of the islands have no volcanoes, and some seem to be non-volcanic in origin. The vegetation as a whole is extremely rich, but has not yet been thoroughly investigated. The animal life belongs to the Australian type, and closely resembles that of New Guinea. Some Asiatic mammals, such as deer, are found, especially on the large islands. None of the islands but Batjan has any monkeys; and the mammals altogether are few in number. Birds are numerous and varied. Of 200 species of land-birds, 140 are peculiar to the islands; parrots, pigeons, and kingfishers are by far the most numerous kinds, and constitute a third of the whole.

In 1521, Antonio de Brito first appeared to take possession of the Moluccas in the name of the king of Portugal; and after a long period of violence, intrigue, and perfidy, the Portuguese were driven out by the Dutch and natives, at the beginning of the 17th century. The change was of no advantage to the natives, for the Dutch, having obtained the exclusive right of buying all the cloves, at a nominal value, a series of wars ensued, which resulted in the subjugation of the Spice Islands. Recently, new sultans of Ternate and Tidore have been appointed, with less power than their predecessors; and the wars with the Alfoers of Ceram, 1859-60, have brought them more fully under Dutch rule, with a decided improvement in their condition.

MOLY, n. *mō'lĭ* [Gr. *mōlŭ;* L. *mōly*, moly]: wild garlic—the *Allĭum moly;* a fabulous herb having a white flower and a black root, mentioned by Homer as possessing magic power against the charms of Circe; the *Allĭum magĭcum*, ord. *Lĭlĭācĕæ*. A reminiscence of the Circean legend is probably still traceable in the garlic called Sorcerer's Garlic.

MOLYBDENA, n. *mŏl'ĭb-dē'nă*, or MOLYBDENITE, n. *mōl-ĭb'dĕn-īt* [Gr. *molubdai'na*, a mass of lead—from *molubdos*, lead: L. *molybdæna*]: a native sulphid of molybdenum, having the formula MoS_2, and crystallizing in tabular or hexagonal forms, probably belonging to the hexagonal system. It has a marked basal cleavage, and resembles some forms of mica. It is leaden-gray in color, with a metallic lustre, a specific gravity of about 4.7, and a hardness of from 1.0 to 1.5. It commonly

occurs in granite, gneiss and other crystalline rocks. In the United States it is found in the New England states, and in New York, Pennsylvania, Colorado, and California. It also occurs in Canada, and crystals from one to two inches in diameter have been discovered in Renfrew county, Ontario.

MOLYBDENUM [symbol Mo, at. wt. = 96 (Hydrogen = 1)]: occurs chiefly as *molybdenite,* MoS. The metal is prepared by reducing the ŏxide with aluminum. It closely resembles wrought iron, may be tempered and is used to alloy with steel. The principal compound is the *oxide* MoO_3, which is an anhydride like sulphur trioxide, SO_3. It forms salts with bases; these, in general, resemble the sulphates. Two of them, which are often used for analytical purposes, are the *sodium* and *ammonium* molybdates, $Na_2MoO_4 .10H_2O$, and $(NH_4)_2MoO_4$, respectively. They are employed to precipitate phosphoric acid as in the analysis of fertilizers. The product formed is yellow and has the formula $(NH_4)_3PO_4 .11MoO_3 .6H_2O$. It is one of the simplest members of a very large number of highly complex salts formed by molybdenum with bases and such acids as phosphoric, arsenic, tungstic, etc.

MOMBASA, *mŏm-bâ'sâ,* or MOMBAZ, *mŏm-bâs':* seaport town of e. Africa, in the territory of the sultan of Zanzibar, on a small coralline island off the coast, in the middle of an estuary formed by two small rivers, lat. 4° 4′ s., long. 39° 43′ e., about 150 m. n. of Zanzibar Island. The shores of the island are rocky and abrupt; and though the channel may be forded at low water, the attempt is attended with danger. The town has the usual Arab characteristics of ruin, neglect, and filth in a striking degree. The only object of interest is an extensive fort, on a rock, cut perpendicularly, 1596, by the Portuguese, and restored by them 1635, as an inscription over the principal gateway indicates. It is a work of considerable pretension, with more than 100 guns in position, but in ruinous condition. The inhabitants, the majority of whom are sunk in abject poverty, mostly live in wretched hovels, scattered among what remains of the once magnificent buildings. The harbor is still good, and is commodious and safe. Mombasa was visited by Vasco da Gama 1497, when he found it a large and very prosperous town. It was held by the Portuguese during most of the period 1529-1720. The English held it 1824-26, when they resigned it. Soon after the Sultan of Muscat obtained possession of the town, which at his death fell to his son, the Sultan of Zanzibar. In 1888 the Imperial British East Africa Company received governing rights over it, and since then it has passed definitely to British possession. Pop. about 25,000.

MOME, n. *mōm* [imitative word]: for *mum,* silence; a dull, stupid, silent person.

MOMENT, n. *mō′mĕnt* [F. *moment*—from L. *momen′tum*, movement, a very small portion of anything—from *movĕō*, I move: It. *momento*]: the smallest possible portion of time; the unit of time; an instant; one-sixtieth part of a minute; importance; value; force.—The *Moment* of any physical agency, is its importance with reference to some special application. Thus, the moment of a force applied (perpendicularly) to a lever, is the importance of the force as regards turning the lever about its fulcrum. It is, as we know (see LEVER), proportional to the product of the force by the distance of its point of application from the fulcrum. The moment of a force about any axis (to which its direction is perpendicular) is the product of the force by its least distance from the axis; and a similar definition is laid down for moment of velocity and moment of momentum. It is easy to see (see MOMENTUM) that in any system of mutually acting bodies the moment of momentum about any axis remains constant, since the equal mutual forces measure the momentum transferred from one body to another, and the moments of these forces are in pairs equal and opposite. A particular case of this is Kepler's law that each planet describes equal areas in equal times about the sun. *Moment of Inertia* in the rotation of bodies round an axis, is the sum of the products of each particle of the body into the square of its distance from the axis; or if M. be the body, m_1, m_2, m_3, etc., the particles composing it, and r_1, r_2, r_3, etc., their correspond ing distances from the axis, then the moment of inertia of $M = m_1 r_1^2 + m_2 r_2^2 + m_3 r_3^2 +$, etc.; and if a quantity, k, be found such that $Mk^2 = m_1 r_1^2 + m_2 r_2^2 + m_3 r_3^2 +$, etc., then k is called the *radius of gyration*. See CENTRE OF GYRATION. MOMENTARY, a. *mō′mĕnt-ĕr-ĭ*, done in an instant; lasting an extremely short time. MO′MENTARILY, ad. *-ĕr-ĭ-lĭ*, or MO′MENTLY, ad. *-lĭ*, for a moment; every moment. MOMENTOUS, a. *mō-mĕnt′ŭs*, important; weighty; of great consequence. MOMENT′OUSLY, ad. *-lĭ*. MOMENT′OUSNESS, n. *-nĕs*, state of being of the utmost consequence. MOMENTUM, n. *mō-mĕnt′ŭm*, impetus; in *mech.*, quantity of motion in a moving body; the product of the mass by the velocity of a moving body (see below).—SYN. of 'moment': weight; consequence; avail; signification; consideration; twinkling; momentum.

MOMENTANY, a. *mŏm′ĕn-tă-nĭ: OE.* for MOMENTARY.

MOMEN′TUM, or QUANTITY OF MOTION: quantity defined by Newton as proportional to the mass moving, and its velocity, conjointly. If we assume unit of M. to be that of unit of mass moving with unit of velocity, we shall evidently have, for the M. of a mass M, moving with velocity V, the expression MV. And such is the unit generally adopted.

It is shown by experiment that, when force produces motion in any body, the M. produced in one second is proportional to the force—and, in fact, *force is measured by the momentum that it is capable of producing in unit of*

time. Thus, the same force, if acting for one second on each of a number of bodies, produces in them velocities which are *inversely* as their masses. Also when, as in the case of falling bodies, the velocities produced in one second are the same in all, we conclude that the forces are *proportional* to the masses; and, in fact, this is the physical proof that the weight of a body is proportional to its mass. Again, if different forces act, each for a second, on the *same* mass, the velocities produced are proportional to the forces. All these are but different modes of statement of the experimental fact, that force is proportional to the M. that it produces in unit of time; which forms a part of Newton's second Law of Motion.

When two masses act on each other, Newton's third Law of Motion (see MOTION, LAWS OF) shows that the forces that they mutually exert are equal and opposite. The momenta produced by these must therefore be equal and opposite. Thus, in attraction or impact of two masses, *no momentum is lost;* since what is lost by one is gained by the other.

The M. of a system of bodies can be resolved (as velocity is resolved) into components in any assigned directions, likewise the mutual forces of the system may be thus resolved. Applying the previous result, we see at once that in any system of mutually acting bodies (such, for instance, as the solar system), no M. is, on the whole, either gained or lost in any particular direction; it is merely transferred from one part of the system to another. This fact, called the Conservation of M., has caused great confusion in the minds of pseudo-physicists, who constantly confound it with Conservation of Work or Energy, a totally different thing.

The M. produced by a force in any period of time is measured by the product of the force and the *time during which it has acted*—the energy or work done by a force is measured by the product of the force and the *space through which it has acted.* M. is proportional to the simple velocity of a body, and *can never, by any known process, be transformed into anything else.* Energy, when depending on velocity (see FORCE, CONSERVATION OF), is proportional to the *square* of the velocity, and is in the natural world *constantly being transformed from its actual or kinetic form to its potential form, and back again, or to some other kinetic form such as heat, and finally must become heat.* M., on the contrary, is never altered, either in kind or in amount.

In *knocking down* a wall, or in staving in the whole side of a ship, the battering-ram of the ancients (when constructed of sufficient mass, and worked by the proper number of men or animals) was probably nearly as effective as the best modern artillery. But in making a *breach* in a wall, or in punching a hole in the armor of an ironclad, mere massive shot with low velocities (such as those of the Dahlgren guns) are comparatively ineffective, however great their M.; while an Armstrong or Whit-

worth projectile, with a fraction of the momentum, but with great velocity, and, for its size, much greater kinetic energy, effects the object with ease. In many everyday phenomena we see distinctly the difference between these two affections of matter. Thus, a blow delivered from the shoulder by a *heavy* pugilist, even if it be sluggishly given, generally floors the antagonist, without doing much other injury; but a sharp stroke administered by a light weight, while hardly disturbing the adversary's equilibrium, inflicts serious hurt.

MOMIERS, n. *mŏm'ĭ-érz* [F. *momier*—from OF. *momer*, to mumm (see MUMM)]: on the *continent* of Europe, term of reproach or contempt—applied to certain sectaries among Protestants, particularly in Switzerland, and adjacent parts of France and Germany. The Momiers held the doctrines of the divinity of Christ and the total depravity of the human race, and resided principally in the French cantons of Switzerland, where these and other Calvinistic tenets had been almost wholly abandoned. Indeed, preaching on some of these 'debatable doctrines' had been forbidden by the Association of Pastors in the established (Presby.) church. This order was disregarded by the leader of the Momiers, Cæsar H. A. Malan, D.D. (q.v.); and he was shut out of the pulpits of Geneva, and held services at his house, and later at a chapel which he built, though he did not separate himself from the established church. The Momiers were very fervent in their services and vigorous in their denunciation of the prevalent departure from the reformed faith. They were subjected to ridicule, opposition, and restraint; received great aid from Robert Haldane (q.v.); and having reawakened an evangelical interest in Switzerland and adjacent parts of France, the Momiers in large part became merged again in the church.

MOMMSEN, *mŏm'sĕn*, THEODOR: writer on the history and polity of ancient Rome: b. Garding, Slesvig, 1817, Nov. 30; d. Charlottenberg, Prussia, 1903, Nov. 1. Mommsen studied first at Altona, subsequently at the University of Kiel, where he graduated in arts 1843. Having obtained assistance from the Academy of Berlin to defray the expenses of a prolonged course of travel, Mommsen spent three years in investigating Roman inscriptions in France and Italy, and published the results in the Annals of the Archæological Institute of Rome and the Herculanean Academy of Naples. The political disturbances of 1848 diverted Mommsen from his favorite pursuits; and for a time he engaged in politics, taking the editorship of the leading Slesvig-Holstein paper, for which he wrote the leading articles in the summer of 1848. He held for a short time a chair in the University of Leipzig, but his appointment was canceled on account of his strong political tendencies. He was made titular professor of law at Zurich 1852, and at Breslau 1854; and professor of Roman law at Berlin 1858. Among

his most valuable contributions, special mention must be made of the following: *Die Unteritalischen Dialekte* (Leip. 1850), *Corpus Inscriptionum Neapolitanarum* (Leip. 1851); his monographs on *The Chronography of the Year* 354, and *Roman Coins* (Leip. 1850); the edict of Diocletian, *De Pretiis Rerum Venalium* A. 301 (Leip. 1851); *Inscriptiones Regni Neapolit.-Latinæ*, 1852; *Die Rechtsfrage zwischen Cæsar und d. Senat*, 1857; his great work on Roman history, *Röm. Geschichte*, 1854–56, 7th ed. 1881 (ably trans. into English by W. P. Dickson); *Römische Forschungen* (1864); *Res Gestæ Divi Augusti* (1865); *Römisches Staatsrecht* (2d. ed. 1877); *Die Erzählung von Caius Martius Coriolanus;* and *Digesta Justiniani Augusti* (1868–72). His very valuable library was destroyed by fire 1880.

MOMORDICA, *mō-mawr′dĭ-ka:* genus of plants of nat. order *Cucurbitaceæ*, having lateral tendrils, and the fruit splitting when ripe. *M. Balsamina*, native of s. Europe and of the East, produces a curious, oblong, much-warted fruit, the BALSAM APPLE, which, when green, is infused in oil, to form a vulnerary much esteemed in Syria and some other countries. The ripe fruit is a dangerous poison. The plant is used to form arbors.—The large, red, thorny fruit of *M. mixta*, called *Gol-kakra* in India, is there used for food.—*M. echinata* is called the *Gooseberry Gourd*, because its fruit, covered with bristles, is about the size and shape of a large gooseberry. The unripe fruit is used for pickling, and is sometimes seen in Covent Garden market, London.

MOMOTOMBO: highest volcano in Nicaragua, the extremity of the Marrabios Mts., at the head of Lake Managua, about 25 m. n.e. of the city of Leon. It is 7,200 ft. high, of which nearly 3,000 ft. is formed of the scoriæ ejected during eruptions. It is still active, sending out smoke and occasional showers of ashes. It has several vents on its sides, while at its base are a number of hot springs. The summit of M. has never been reached, though Victor Hugo's *La Légende des Siècles* embodies the legend of an ascent by Spanish priests to plant the cross upon it, who were never heard of afterward. The volcano can be seen far out at sea.

MOMPOX, *mōm-pŏch′:* town of the United States of Colombia, on the Magdalena, 110 m. s.e. of Cartagena. Here the Magdalena, during its periodical floods, rises 12 or 15 ft. above its usual level; and the quay and custom-house of M. are built unusually high, to provide against this emergency. All foreign goods for the consumption of the Valley of the Magdalena pass through this town. Pop. estimated 10,000.

MOMUS, n. *mō′mŭs* [Gr. *momos*, derision]: in *anc. myth.*, the god presiding over ridicule, mirth, and raillery, aiming his mocking censure at men and at the gods, and therefore expelled from heaven.

MON, *mŏn*, or MONO, *mŏn′ō* [Gr. *monos*, alone]: a prefix, signifying alone; single; solitary; only one.

MONACHAL, a. *mŏn'ä-käl* [Gr. *mon'achos*, a monk—from *monos*, alone: It. *monacale:* F. *monacal*]: pertaining to monks or a monastic life; living alone; solitary. MON'ACHISM, n. *-kĭzm*, the system, the influences, and the state of a monastic life (see below).

MON'ACHISM, or MONAS'TICISM: in general a state of religious retirement, more or less complete, accompanied by contemplation, and by various devotional, ascetical, and penitential practices; in especial the corporate life of religious communities, in poverty and celibacy, and under a fixed discipline. It is, in truth, ASCETICISM (q.v.), with the element of religious solitude superadded. The institution of M. has, under different forms, entered into several religious systems, ancient and modern. That it was known among the Jews before the coming of Christ, appears from the example of the prophet Elias, and from that of the Essenians; and it is probable that religious seclusion formed part of the practice of the NAZARITES (q.v.), at least in the later periods of Jewish history. In the Brahmanical religion, it has had prominent place; and even to the present day, the *lamaseries* of Tibet may be said to rival in number and extent the monasteries of Italy or Spain. The Christian advocates of M. find in the gospel exhortations to voluntary poverty (Matt. xix. 21) and to celibacy (I Cor. vii. 37), at once the justification and the origin of the primitive institution. Its first form appears in the practice of asceticism, of which we find frequent mention early in the 2d century. The primitive ascetics, however, lived among the brethren, and not till the 3d c. did the peculiar characteristic of M. appear in the church. The earliest form of Christian M. is also the most complete—that of the ANCHORITES (q.v.); and is commonly believed to have in part originated in the persecutions, from which Christians were forced to retire into deserts and solitary places. The anchorets maintained from choice, after the cessation of the persecutions, the seclusion to which they had originally resorted as an expedient of security; and a later development of the same principle is found in the still more remarkable psychological phenomenon of the celebrated PILLAR-SAINTS (q.v.). After a time, however, the necessities of the religious life itself—as the attendance at public worship, the participation of the sacraments, the desire for mutual instruction and edification—led to modifications of the degree and of the nature of the solitude. First came the simplest form of common life, which sought to combine the personal seclusion of individuals with the common exercise of all the public duties; an aggregation of separate cells into the same district, called by the name *Laura*, with a common church, in which all assembled for prayer and public worship. From the union of the common life with personal solitude is derived the name *cenobite* (Gr. *koinos bios*, common life), by which this class of monks is distinguished from the strict solitaries, as the anchorets or eremites, and in which is involved, in addition to the obligations

of poverty and chastity, which were vowed by the anchorets, a third obligation of obedience to a superior, which, in conjunction with the two former, has ever since been held to constitute the essence of the 'religious' or monastic life. For the origin of the strictly cenobitical or monastic life, see ANTONY, SAINT: he may be regarded as its founder in the East, either by himself or by his disciples. So rapid was its progress, that his first disciple, PACHOMIUS (q.v.), lived to find himself the superior of 7,000. In the single district of Nitria, there were no fewer than 50 monasteries (Sozomen, *Eccles. History*, vi. 31), and before long, the civil authorities judged it expedient to place restrictions on their excessive multiplication. It seems to be admitted, that, in the East, where asceticism has always been held in high estimation, the example of Christian M. had a powerful influence in forwarding the progress of Christianity; though it is also certain that the admiration which it excited occasionally led to its natural consequence among the members, by eliciting pride and ostentation, and by provoking, sometimes to fanatical excesses of austerity, sometimes to hypocritical simulations of rigor. The abuses which arose, even in the early stages of M., are deplored by the very Fathers who are most eloquent in their praises of the institution itself. These abuses prevailed chiefly in a class of monks called *Sarabaitæ*, who lived in small communities of three or four, and sometimes led a wandering and irregular life. On the other hand, an extraordinary picture is drawn by Theodoret, in his *Religious Histories*, of the rigor and mortification practiced in some of the greater monasteries. The monks were commonly zealots in religion; and much of the bitterness of the religious controversies of the East was due to that unrestrained zeal; and it may be added that the opinions which led to these controversies originated mostly among the theologians of the cloisters. Most famous among these were an order called *Acœmetæ* (Gr. sleepless), from their maintaining the public services of the church day and night without interruption. See MONOPHYSITES: MONOTHELISM: NESTORIANS: IMAGE-WORSHIP.

It was in the cenobitic rather than the eremitic form that M. was introduced into the West, at Rome and in n. Italy by Athanasius; in Africa by St. Augustine; and afterward in Gaul by St. Martin of Tours. Here also the institute spread rapidly under the same general forms in which it is found in the Eastern Church; but considerable relaxations were gradually introduced, and it was not until the thorough reformation, and, as it may be called, religious revival effected by the celebrated ST. BENEDICT (q.v.), in the beginning of the 6th c., that western M. assumed its peculiar and permanent form. In some of the more isolated churches, e.g., that of Britain, it seems that the reformations of St. Benedict were not introduced until a late period; and in that church, as well as in the church of Ireland, they were a subject of considerable controversy. One of the most important modifications

of M. in the West, regarded the nature of the occupation in which the monks were to be engaged during the times not directly devoted to prayer, meditation, or other spiritual exercises. In the East, manual labor formed the chief, if not the sole external occupation prescribed to the monks; it being held as a fundamental principle, that for each individual the main business of life was the sanctification of his own soul. In the West, besides the labor of the hands, mental occupation also was prescribed, not for all, but for those for whom it was especially fitting. From an early period, therefore, the monasteries of the West, particularly of Ireland, or of the colonies, founded by Irish monks, e.g., Iona and Lindisfarne, became schools of learning, and training-houses for the clergy. At a later period, most monasteries possessed a *scriptorium*, or writing-room, in which the monks were employed in the transcription of MSS.; and though a great proportion of the work so done was, as might naturally be expected, in the department of sacred learning, yet it cannot be doubted that to the scholars of the cloister we owe the preservation of most of those masterpieces of classic literature which have reached our age.

In the remarkable religious movement which characterized the church of the 12th c. (see FRANCIS OF ASSISI: FRANCISCANS), the principle of M. underwent a further modification. The *spiritual egotism*, so to speak, of the early M., which in some sense limited the work of the cloister to the sanctification of the individual, gave place to the more comprehensive range of spiritual duty, which, in the institute of the various bodies of FRIARS (q.v.), which that age produced, made the spiritual and even the temporal necessities of one's neighbor equally with, if not more than, one's own, the object of the work of the cloister. For the progress of these various bodies, in the 12th c. and since, see their several titles. It remains to detail the later history of M., properly so called. Almost all the monastic institutes or the West are offshoots or modifications of the BENEDICTINES (q.v.); of these, the most remarkable are the CARTHUSIANS, CISTERCIANS, GRANDMONTINES, CLUGNIACS, PREMONSTRATENSIANS, and above all MAURISTS, or Benedictines (q.v.) of St. Maur. In more modern times, other institutes have been founded for the service of the sick, for the education of the poor, and similar works of mercy, which also are classed under the denomination of monks. For the most important of these, see their several titles.

The inclosure within which a community of monks reside is called a MONASTERY (q.v.) —Gr. *monasterion*, Lat. *monasterium*. By the strict law of the church, called the law of cloister or inclosure, it is forbidden to all except members of the order to enter a monastery; and in almost all the orders, this prohibition is rigidly enforced as regards the admission of females to the monasteries of men. To such a length is this carried in the Greek Church, that in the celebrated inclosure of Mount Athos, not only women, but all animals of the female

sex are rigorously excluded. The first condition of admission to a monastic order is the approval of the superior, after which the candidates remain for a short time as *postulants*. After this preliminary trial, they enter on what is called the *novitiate*, the length of which in different orders varies from one to three years; and at its close they are admitted to the profession, at which the solemn vows are taken. The age for profession has varied at different times and in different orders; the Council of Trent, however, has fixed 16 as the minimum age. Originally, all monks were laymen; but after a time, the superiors, and by degrees other more meritorious members, were admitted to holy orders. For the distinction of priest-monks and lay-brothers, see FRIAR; but in both alike, where the order is one of those solemnly approved by the church, the engagement taken at the final profession is life-long and irrevocable.

The monastic institute, from the very earliest time, embraced women as well as men. The former were called in Greek by the name *nonis* or *nonna*, and in Latin *nonna* (from which the English *nun*), as also *sanctimonialis*. The cloistered residence of nuns is called by various names, as NUNNERY, CONVENT, a name applied to the houses of men also. The general characteristics of the monastic institute for women are substantially identical with those for men: see the respective titles of the principal varieties of institute.

The reformed churches in the 16th c. discarded the practice of M., and the monastic houses were suppressed by Prot. governments. In some of the German states, the temporalities of the suppressed monasteries were retained, and were granted at pleasure by the sovereign, together with the titular dignity. Some of the German churches, however, in later times, have revived the institute both for men and for women, as has been done also in the Anglican Church both in the time of Laud and in our own day. In all these Prot. revivals of M., however, the engagement is revocable at the will of the individual. At the French Revolution, the monastic establishments of France were utterly suppressed; and in most of the other Rom. Cath. countries of Europe, the example has been followed to a greater or less extent. In England and Ireland and the United States, on the contrary, the institute has made rapid progress of late years. Most of the orders introduced are of the active rather than of the contemplative class. Besides references above, see BROTHERHOODS: SISTERHOODS: BROTHERS AND SISTERS OF CHARITY.

MONACO, *mŏn'ȧ-kō:* smallest of European sovereign principalities; surrounded by French territory, on the Mediterranean coast, a few miles n.e. of Nice. It has long been notorious for the public gaming-tables, supplying great part of the revenues of the prince, at Monte Carlo (q.v.), e. of the town of M. The climate is fine, so that palms and aloes grow luxuriantly. From the 10th to the 18th c., M. was held by the Genoese family of Grimaldi. In 1815, it was ceded to Sardinia, which, however, recognized its independence, but reserved to itself the right of garrisoning the town of M. At this period, it consisted of three communes—Monaco, Mentone, and Roccabruna, with 52 sq. m., and pop. about 7,000. In 1848, Mentone and Roccabruna were annexed to Sardinia, in spite of a protest by his 'serene highness,' Carlo Honorio, third prince of M. The Italian war of 1859 placed the whole territory for a brief period under Victor Emmanuel; but Carlo Honorio sold Mentone and Roccabruna (1861) to the French emperor for 4,000,000 francs. M. itself is now also under French protection. The sovereign prince of M. possesses nothing but the city and a small patch of territory, total area 6 sq. m.; pop. (1900) 15,180.—The *town* of M. is a beautiful place on a rocky promontory; pop. (1890) 3,292; (1900) 3,292.

MONAD, n. *mŏn'ăd* [F. and It. *monade*—from mid. L. *monădem*, a unit: Gr. *monas* or *monăda*, unity, a monad —from *monos*, alone]: an indivisible thing; that which is one; an ultimate atom: for *Monad*, in philosophy, see below. In *chem.*, a univalent element—that is, one whose atom, like hydrogen, is supposed to have only one combining point; the simplest and extremely minute kind of microscopic animalcules (see below, MONAD, in Biology): a primary cell. MONADIC, a. *mŏn-ăd'ĭk*, or MONAD'ICAL, a. *-i-kăl*, resembling a monad.

MON'AD, in Biology: generic name of many kinds of microscopic organisms, very minute, and supposed to be also of very simple organization. They appear, even under a powerful microscope, as mere points, moving rapidly through the fluid in which they exist, and often becoming aggregated in clusters; or they are seen to be gelatinous and globular, or nearly so, with a tail or thorn-like filament, by the vibrations of which they move. When the fluid is tinted by means of some harmless coloring matter, the existence of several cells or vesicles is discerned within the minute body. Ehrenberg therefore classed them among Polygastric Infusoria (see INFUSORIA), and no naturalist doubted their right to a place, though one of the lowest, in the animal kingdom. They are now universally regarded as vegetable, and are ranked among algæ. The organisms formerly known as Globe Animalcules (*Volvox*) are clusters of monads produced by gemmation from one monad and invested with a common envelope. Monads are of various colors. Their gemmation takes place according to fixed laws, so that the groups assume particular forms, characteristic of the different kinds. Thus, in the 'Breast-plate Animalcule'

(*Gonium pectorale*), so called from the form which the group frequently presents, a division takes place into four, and the number in a group is always either 4 or 16, a group of 16 always dividing into 4 parts, each of which contain 4 monads.—The minute moving points often seen under the microscope are probably not usually monads, but spores or germs.

MON'AD, in Philosophy: term first used in Greek philosophy, where it applies originally to the idea of mathematical unity. By moderns, especially by BRUNO and LEIBNITZ (q.v.), from whose systems the term has chiefly derived importance, it is used to describe the primary elements of all reality. The monads, in Leibnitz's philosophical speculation, are simple uncompounded substances, without figure, without extension, without divisibility, by the aggregation of which all bodies are formed, and into which all compounded things may ultimately be resolved. The monads are created things, but as being uncompounded, are indestructible; and though subject to change, the change is only external or relative. They may be divided roughly into three classes. The lowest class never emerge into definite consciousness, but remain in a comatose state. The next class possess feeling and memory and may be called souls. The highest class possess self-consciousness and a knowledge of universal truths. The Deity is the PRIME MONAD, or MONAD OF MONADS. The theory of monads enters largely into the philosophic system of Leibnitz, and indeed furnishes the key to much in that system which is otherwise obscure.

MONADELPHIA, n. *mŏn'ă-dĕl'fĭ-ă* [Gr. *monos*, alone; *adelphos*, a brother]: in *bot.*, plants having hermaphrodite flowers, in which all the stamens are united into one bundle by union of their filaments, through which the pistil passes. MON'ADELPH, n. *-dĕlf*, one of the *monadelphia*. MON'ADEL'PHIAN, a. *-fĭ-ăn*, or MON'ADEL'PHOUS, a. *-fŭs*, pertaining to the monadelphia; having the stamens united into one bundle by union of their filaments.

MONAD'NOCK, GRAND. See GRAND MONADNOCK.

MONAGHAN, *mŏn'a-ĉhan:* inland county of the province of Ulster, Ireland, between Tyrone on the n., Armagh and Louth on the e., Meath and Cavan on the s., and Fermanagh on the w. Its greatest length n. to s. is 37 m.; its greatest breadth, e. and w., 28; 500 sq.m., or 319,757 acres, of which 285,885 are arable. The general surface is undulatory, the hills, except in the n.w. and e., being of small elevation, though often abrupt; the highest point does not exceed 1,254 ft. above the sea. There are many little lakes, usually shallow; and though the streams are numerous, there is no navigable river. In geological structure the level country belongs to the great central limestone district; the rest is of the same

transition formation as in the northern tract of Leinster. No minerals are found in remunerative quantity; there is a small coal-field in the s. border, not profitably worked. The soil is very varied in character, and mostly wet and imperfectly drained, though commonly capable of much improvement; but in general it is suitable for cereal crops (except wheat, which is little cultivated), and of flax. Monaghan is well supplied with good roads, and is connected by railway with Dublin, Belfast, and Galway, and directly with the coast at Dundalk. The Ulster canal passes through the county. Principal towns are Monaghan (q.v.), Carrickmacross, Clones, and Castle-Blarney.—Monaghan, at the invasion, formed part of the grant of Henry II. to De Courcey, and was partially occupied by him; but it speedily fell back into the hands of the native chiefs of the sept MacMahon, by whom (with some alterations of re-conquests) it was held till the reign of Elizabeth, when it was erected into a shire. Even still, however, the authority of the English was in many places little more than nominal, especially in the n.; and in the rising of 1641, the MacMahons resumed the territorial sovereignty. The historical antiquities of the county are of little interest or importance. The name is from Irish *Muinechan*, 'Monkstown,' a monastery having stood here at very early date. Monaghan possesses two round towers, one complete, at Clones, the other at Inniskeen; and there are many remains of the ancient earthworks commonly referred to the ante-English period. Pop. (1901) 74,611.

MONAGHAN, JOHN JAMES: American Roman Catholic prelate: b. Sumter, S. C., 1856, May 23. He was educated at St. Charles College, Md., pursued a theological course at St. Mary's Seminary, Baltimore, and was ordained to the priesthood in 1880. He held several pastorates in Charleston, S. C., and elsewhere, was chancellor of the diocese 1887-8, and assistant to the vicar-general at St. Patrick's, Charleston, 1888-97. In May of the last named year he was consecrated bishop of Wilmington.

MONAL, or MONAUL: a name among Anglo-Indian sportsmen for any of several Himalayan pheasants, especially the gorgeous species of the crested genus *Lophopterus*. See IMPEYAN PHEASANT.

MONAMINE: in chemistry, an amine that is derived by replacing one or more of the hydrogen atoms of a single molecule of ammonia by an equal number of monovalent organic radicals. Amines that are derived by joining two, three, or four molecules of ammonia, through the partial replacement of their hydrogen by a single polyvalent radical, are called di-, tri-, and tetra-amines respectively; and the monamines are known as primary, secondary or tertiary, according as one, two or three of the hydrogen atoms of the ammonia molecule have been replaced. See AMINE and AMIDE.

MONANDRIA, n. *mŏn-ăn'drĭ-ă* [Gr. *monos,* alone; *aner* or *andra,* a man]: in *bot.,* a class of plants which have only one stamen. MONAN'DRIAN, a. *-drĭ-ăn,* or MONAN'DROUS, a. *-drŭs,* having one stamen only. MONAN'-DRY, n. marriage to one husband only; opposed to polyandry.

MONARCH, n. *mŏn'ârk* [Gr. *monarchos,* one who reigns alone, a monarch—from *monos,* alone; *archein,* to rule: F. *monarque:* It. *monarca*]: the prince or ruler of a country; a king; a sovereign; a potentate; a person or thing superior to others of the same kind: ADJ. supreme; ruling. MONARCHAL, a. *mŏn-âr'kăl,* regal; pertaining to or suitable to a monarch. MONAR'CHIC, a. *-kĭk,* or MONAR'-CHICAL, a. *-kĭ-kăl,* of or relating to a monarchy; vested in a single ruler. MONAR'CHICALLY, ad. *-lĭ.* MONAR-CHIZE, v. *mŏn'ėr-kīz,* to rule over as a monarch; to play the monarch. MON'ARCHIZING, imp. MON'ARCHIZED, pp. *-kīzd.* MON'ARCHISM, n. *-kĭzm,* principles or state of monarchy. MON'ARCHIST, n. *-kĭst,* an advocate of monarchy. MON'ARCHY, n. *-kĭ* [F. *monarchie,* a monarchy—from Gr. *monar'chiă,* a kingdom]: state or government in which the supreme power is vested in a single person, being either limited or absolute; a kingdom; an empire. See below.

MONAR'CHIANISM: doctrinal conception by a party in the early church (about 180-320) relative to the nature of Jesus Christ; which, while retaining his office as the Divine and only Redeemer of sinful man, refused to admit more than one person in the Deity. The history of this party is obscure; and there were several groups with varying opinions, which are brought to our knowledge mostly through the representations of their adversaries. Monarchianism has often been divided into: 1. Dynamic Monarchianism, holding that Christ was not pre-existent in God, but was a man fully endowed with divinity by direct communication from God—i.e., that he was empowered as God; 2. Modalistic Monarchianism, holding that Christ was so absolutely God and One with the Father, that he was not a divine distinct person, but the mode of manifestation of the single absolute divine essence. This division is not fully adequate as a classification of monarchian doctrines, though helpful. The monarchians were called also Patripassians (q.v.); and later, Sabellians (see SABELLIUS). Pope Victor I. in the 2d c. excommunicated Theodotus the Tanner who professed the dynamic theory, and an Asiatic synod (268) condemned and anathematized the view as taught by the noted Paul of Samosata, the minister of Zenobia, queen of Palmyra. Monarchianism was revived in the 16th c. by Socinus, and is in some form or other the essential basis of certain Unitarian creeds. See also INCARNATION, and ARIUS—showing subsequent historical developments of the monarchian tenets, and the resulting controversies.

MON'ARCHY: form of government in a community by which one person exercises the sovereign authority. It is only when the king, or chief magistrate of the community, possesses the entire ruling power, that he is properly a monarch. Most of the oriental governments past and present, Russia at present, and Spain and France in the 18th c., are in this strict sense monarchies. The degenerate form of M. is tyranny, or government at the mere will and for the benefit of the ruler. When the head of the state, still possessing the status and dignity of royalty, shares the supreme power with a class of nobles, with a popular body, or with both, as in Britain, the government, though no longer in strictness monarchical, is called in popular language a mixed or limited M., the term absolute M. being applied to a government properly monarchical. The highest ideal of government would perhaps be attained by an absolute M., if there were any security for always possessing a thoroughly wise and good monarch; but this condition is obviously unattainable, and a bad despot is a measureless evil. It therefore becomes desirable that a governing class, composed, if possible, of the wisest and most enlightened in the country, should share the supreme power with the sovereign. A limited M. has this advantage over an aristocratic republic, that in difficult crises of the nation's existence royalty becomes a neutral and guiding power, raised above the accidents and struggles of political life.

M., usually hereditary, has sometimes been elective, a condition generally attended with feuds and distractions, as in Poland. The elective system is still followed in the choice of the pope. Constitutional M. may be in its origin elective, or combine both systems, as when one family is disinherited, and the sceptre declared hereditary in the hands of another under certain conditions. See KING: REPUBLIC: GOVERNMENT: CONSTITUTION, in Politics.

MONASTERY, n. *mŏn'ăs-tĕr-ĭ* or *mŏn'ăs-trĭ* [F. *monastère*—from Gr. *monastēriŏn*, a place where one may live in solitude—from *monos*, alone: It. *monastero*, a monastery: mid. L. *monastēriŭm*, a minster]: a religious house for retirement; an abbey; a convent, for either monks or nuns, but more usually the former. MONASTIC, a. *mŏ-năs'tĭk*, or MONAS'TICAL, a. *-tĭ-kăl*, pertaining to monks or to monasteries; secluded from the world; devoted to religion. MONAS'TICALLY, ad. *-lĭ*. MONAS'TIC, n. *-tĭk*, a monk. MONAS'TICISM, n. *-tĭ-sĭzm*, monastic life (see MONACHISM). MONAS'TICON, n. *-tĭ-kŏn*, a book on monasteries.—SYN. of 'monastery': priory; abbey; cloister; convent.

MON'ASTERY: generic name of the residence of any body of men, or more rarely, of women, bound by monastic vows: see MONACHISM. In the Western Church—here had in view—there were various classes of monastic establishments. The name, in its most strict acceptation, is confined to the residences of monks, properly so

called, or of nuns of the cognate orders (as the Benedictine), and as such, it comprises two great classes, the *Abbey* and the *Priory*. The name Abbey was given only to establishments of the highest rank, governed by an abbot, who was commonly assisted by a prior, sub-prior, and other minor functionaries. An abbey always included a church, and the English word *Minster*, though like the cognate German *Münster* it has now lost its specific application, had its origin in the Latin *monasterium*. A *Priory* supposed a less extensive and less numerous community. It was governed by a prior, and was originally, though not uniformly, at least in later times, subject to the jurisdiction of an abbey. Many priories possessed extensive territorial domains, and of these, not a few became entirely independent. The distinction of abbey and priory is found equally among the Benedictine nuns. In the military orders, the names *Commandery* and *Preceptory* corresponded with those of abbey and priory in the monastic orders. The establishments of the Mendicant, and, in general, of the modern orders, are sometimes, though less properly, called monasteries. Their more characteristic appellation is *Friary* or *Convent*, and they are commonly distinguished into *Professed Houses* (called also *Residences*), *Novitiates*, and *Colleges*, or *Scholastic Houses*. The names of the superiors of such houses differ in the different orders. The common name is *Rector*, but in some orders the superior is called *Guardian* (as in the Franciscan), or *Master*, *Major*, *Father Superior*, etc. The houses of women—except in the Benedictine or Cistercian orders—are called indifferently *Convent* and *Nunnery*, the head of which is styled *Mother Superior*, or *Reverend Mother*. The name *Cloister* properly means the inclosure; but it is popularly used to designate, sometimes the arcaded ambulatory which runs around the inner court of the building; and sometimes in the more general sense of the entire building, when it may be considered synonymous with *Convent*.

MONASTIR′: seaport town of n. Africa, dominion of Tunis, on the gulf of Sidra, 80 m. s.s.e. of the city of Tunis. Woolen and camlet fabrics are manufactured, and there is some maritime trade. Pop. 12,000.

MONASTIR, *mō-nâs-tēr′*, TOLI-MONASTIR, or BITOLIA: town of European Turkey, cap. of the vilayet of M.; in a broad valley of the Niji Mountains, 90 m. n.n.e. of Janina, and about the same distance w.n.w. of Saloniki. It is an important place, is the residence of the gov.gen., and commands the routes between Macedonia and n. Albania. The inhabitants are mostly Greeks and Bulgarians. M. has 11 mosques. There is large trade with Constantinople, Saloniki, Vienna, and Trieste: from Constantinople alone it annually buys goods to the value of $7,500,000. Its bazaars contain more than 2,200 shops. In 1903, May, the town was the scene of rioting and massacre, in which a considerable number of Bulgarians were killed before the Turkish troops were able to suppress the outbreak.

MONAZITE [Greek, *solitary,* in allusion to its rare occurrence]: a native phosphate of the metals of the cerium group, often also containing more or less thorium silicate. It is reddish or brownish in color, with a resinous lustre, and crystallizes in the monoclinic system, though it also occurs in massive and granular forms. It is commonly translucent and brittle, with a hardness of from 5 to 5.5, and a specific gravity of about 5.0 to 5.2. It is found at Norwich, Conn., and also in the Ural district, as well as in other parts of the world. The chief commercial supply, however, comes from North Carolina and from certain parts of Brazil. In these regions monazite is a constituent of the granitic rocks, and is obtained by washing the gravels and sand that have been formed by the disintegration of those rocks. The Brazilian output has been controlled by a German syndicate since 1902, and practically all of it now goes to Europe. The monazite produced in the United States comes chiefly from Burke and Cleveland counties, North Carolina. The total production of the mineral in this country in 1901 was 748,736 pounds. Monazite owes its industrial importance to the cerium and thorium that it contains, the former being utilized for the preparation of cerium oxalate, which is used in medicine and in the arts, while the thorium is employed in the manufacture of mantles for incandescent gas-lighting.

MONBODDO, *mŏn-bŏd'ō,* JAMES BURNET, Lord: Scottish lawyer and author: 1714-1799, May 26; b. Monboddo, in Kincardineshire. He was educated at Marischal College, Aberdeen, where he showed fondness for the Greek philosophers; and afterward studied law three years at Groningen, Holland. In 1737, he became a member of the Scottish bar, and soon obtained considerable practice. In 1767, he was raised to the bench, as Lord Monboddo. Monboddo's first work on the *Origin and Progress of Language* (1771-76), is very learned, heretical, and eccentric; yet in the midst of its grotesque crotchets there occasionally flashes out a wonderfully acute observation, that makes one regret the distorted and misapplied talent of the author. In the present day the notion that men have sprung from monkeys is perhaps that most associated with the name of Monboddo, who gravely asserted that the orang-outangs are members of the human species, and that in the Bay of Bengal there exists a nation of human creatures with tails, and that men generally have only worn away theirs by sitting on them, but that the stumps may still be felt. Monboddo wrote also *Ancient Metaphysics,* 6 vols. (1779-99).

MONCADA, *mŏn-kâ'thâ,* DON FRANCISCO DE, Conde de Osona: historian, and one of the Spanish classics: 1586, Dec. 29—1635; b. Valencia, where his grandfather was then viceroy. Descended from one of the greatest families of Catalonia, he rapidly rose to the highest offices

in the state, was ambassador to Vienna, and latterly governor of the Netherlands, and commander-in-chief of the Spanish troops there. He fell at the siege of Goch, a fortress in the duchy of Cleves. His *Historia de la Expedicion de Catalones y Aragoneses contra Turcos y Griegos* (Barcelona 1623, frequently reprinted), is a masterpiece in liveliness and elegance of style.

MONCALIERI, *mōn-kâ-lē-ā'rē:* town of Italy, province of Turin, situated finely on the slope of a hill, on the right bank of the Po, five m. above Turin. Moncalieri is the first railway station between Turin and Genoa, and communicates daily with Turin by frequent omnibuses; it has fine buildings, including a palace lately embellished for the residence of King Victor Emmanuel. The annual cattle-fair at Moncalieri, in October, is the most important in n. Italy. Pop. 3,030.

MÖNCHEN-GLADBACH. See GLADBACH.

MONCTON, *mŭnk'ton:* city and port of entry in Westmoreland county, New Brunswick, Canada; at the head of navigation of the Petitcodiac river, a tidal stream entering the Bay of Fundy; and on the Intercolonial railway, 86 miles northeast of St. John, and 185 miles northwest of Halifax. It has a good harbor and an extensive trade in lumber and produce. The tide in the Petitcodiac estuary is one of the most remarkable in the world, coming in with a bore from 4 to 6 feet high and rising to a maximum height of 70 feet. The offices and chief workshops of the Intercolonial railway are here, and there are manufactures of sugar, cotton and woolen goods, leather, woodenware, tobacco, etc. Pop. (1901) 9,026.

MONDAY, n. *mŭn'dā* [AS. *monandæg*, the day sacred to the moon—from *mona*, the moon; *dæg*, a day]: the second day of the week. The name is a translation of the Roman name *Lunæ Dies* (Day of the Moon)—following the Roman custom in naming the days of the week after the planets.

MONDE, n. *mōngd* [F. world]: a number or circle of people who know and visit each other; the world; society. BEAU-MONDE, n. *bō-mōngd'* [F.]: the fashionable world. DEMI-MONDE, *dĕm'ĭ-* [F. *demi*, half]: a name given to the so-called higher class of prostitutes in every large town and city.

MONDOVI, *mōn'dō-vē:* town in Cuneo, one of the provinces of n. Italy, on the shoulder of a hill 50 m. s. of Turin. It is divided into four sections: the Piazza and three suburbs. There are manufactures of cloth and silk. The Piazza contains a fine cathedral, with rich paintings; an episcopal palace, with a noble gallery of portraits; and the various judicial and educational halls. At the battle of Mondovi, 1796, Apr. 22, the Sardinians were totally defeated by Bonaparte. Pop. 19,300.

MONEMBRYONY, n. *mŏn'ĕm-brĭ'ō-nĭ* [Gr. *monos*, one; *embruon*, an embryo]: in *bot.*, the production of one embryo only. MONEM'BRYON'IC, a. *-brĭ-ŏn'ĭk*, having a single embryo.

MONERA, n. plu. *mŏn-ē'ră* [Gr. *monērēs*, solitary]: class of Protozoa (q.v.) proposed by Haeckel to include the very lowest organisms known—mere masses of undifferentiated protoplasm, resembling *Amœba* (see PROTEUS), but unprovided with a nucleus. The monera present specific and even generic distinctions. *Protamœba* and *Protomyxa* are examples of monera. The glairy mud found among the calcareous sediment that covers great part of the bed of the n. Atlantic was formerly referred to the monera, and called *Bathybius*, but Prof. Huxley, who conferred the name, now denies its organic nature. See BATHYBIUS.

MONESIA BARK, *mo-nē'sĭ-a:* bark of a tree (*Chrysophyllum glycyphlœum* or *C. Buranheim*), of the same genus with the Star Apple (q.v.), native of s. Brazil. The bark is lactescent; but when dried, it is thick, flat, compact, heavy, brown, and hard, with a taste at first sweet, afterward astringent and bitter. A substance called *Monesia* is extracted from it, which is almost black, at first sweet, then astringent, finally acrid: it is used as a stomachic and alterative in leucorrhea, chronic diarrhea, etc. It contains, in small quantity, a principle called *Monesin.*

MONEY, n. *mŭn'ĭ* [OF. *moneie;* F. *monnaie*, money—from L. *monēta*, a surname of Juno, in whose temple at Rome money was coined; the mint: It. *moneta* (see MINT, note)]: coin in gold, silver, or copper; stamped metallic pieces, being the legalized currency of a country; anything which passes as a money equivalent, in commercial dealings, e. g., bank-notes (see MONEY, below): wealth; affluence. MONEYS, n. plu. *mŭn'ĭz*, the various sums included in one total; different sums of money. MONEYED, or MONIED, a. *mŭn'ĭd*—the former preferable—rich in money; consisting in money. MONEYERS, n. plu. *mŭn'ĭ-ĕrz*, officers of the royal mint who superintend the coining of money; the men employed in the making of coins for money. MON'EYLESS, a. *-lĕs*, destitute of money. MONETARY, a. *mŭn'ĕ-tĕr-ĭ*, relating to money or moneyed affairs. MONETIZE, v. *mŭn'ĕt-īz* [L. *moneta*, money]: to give a standard value to, in the coinage of a country; to form into coin. MONEY BILL, in *Brit. parliament*, bill or measure before the house of commons for the raising or granting of money for the use of government. MONEY-CHANGER, one who deals in money or exchanges. MONEY-LENDER, one who lends money on interest. MONEY-MAKING, acquiring or gaining wealth. MONEY MARKET, general term for the course or the state of transactions in money, in discounts, loans, and payments, in such places as Lombard Street, London; Wall Street, New

York; the Stock Exchange, the Bank of England, and other banks. MONEY MATTERS, affairs about money. MONEY ORDER, an order, payable at sight, granted by a post-office for any small sum of money, and made payable at certain post-offices—granted on depositing the sum named and the payment of a small commission. MONEY-SCRIVENER, person who procures the loan of money for others. MONEY'S WORTH, full value.—SYN. of 'money': coins; cash; specie.

MONEY: the tool or medium of exchange; hence, in general, anything used by common consent for that purpose; whether animal skins, shells, grain, tobacco, beads, salt, tea, metal or paper, all of which have at times been so used. It is that one commodity singled out by general agreement as an improvement upon the primitive method of exchange by *barter*. The adoption of some common object antedates recorded history; indeed it seems certain that the use of the precious metals as money, which was an important step in the world's progress, is so old with some people that it is probably referable to a period 2,000 years before Christ. The Chinese claim to have used coins 2500 B.C., and in other parts of Asia gold and silver passed by weight somewhat later. Yet in Siam cowrie-shells were legal money until early in this century and beads can still be used in Africa.

Gold, silver and copper proved the most serviceable objects for the purpose. Naturally they first passed by weight, as is conclusively shown by the names of pieces of money that have come down to us: the *pound*, the *lira*, the *peso*, the former *livre*, the ancient Roman *as* and the still more ancient *shekel;* the present *tael* of China is a weight, not a coin. It was important that the money be honest; to eliminate frauds the act of coinage was evolved, by which pieces of fixed weight of metal, duly certified, were provided. Eventually the function of coining was assumed by sovereigns and governments; some of the former were not above cheating by issuing false coin at times.

The qualities which made the metals most acceptable of all commodities are possessed specially by gold; it has value owing to its beauty, for ornamentation, and its relative scarcity; it is practically indestructible, losing almost nothing in melting; it is easily shaped and divided; it is homogeneous; wherever found is the same after refining; it contains large value in small space, hence is portable; moreover, the value is least liable to severe fluctuations. Corn, for example, does not possess these characteristics. Hence, also, gold, even although subject, as are all other commodities, to the law of supply and demand, is altogether the most serviceable, when the further functions and uses of money are considered; these are the *standard* or *measure of value* and the *store of value* for future payments. For these purposes sta-

bility is obviously essential. Perishable or cheap commodities would prove unserviceable.

It was found very early in the world's history that gold was held the superior metal; hence the others were rated accordingly; thus one ounce of gold was held worth four ounces of silver and eight ounces of copper; the *ratio,* as it is termed, has been repeatedly altered, gold steadily advancing in relative value in the long run. This was due in large part to the great increase in production of the inferior metals; their commercial value fluctuated considerably and hence they became less serviceable as value measures. The great increase in the production of gold in recent years has led to the suggestion that it will also have to be superseded in monetary use; but this question need not now be considered.

Copper lost its position as a general money metal among civilized people centuries ago; it continues to be employed merely for the coins of smallest value today. Silver was displaced gradually during the last century, after long-continued agitation, following the disturbance in the exchange relations between silver-using countries and those having the gold standard. The fluctuations in the commercial ratio rendered transactions with the Far East, for example, where silver has for ages been the sole currency, largely speculative. International conferences were held (1878, 1881, 1892) to endeavor to reach a general agreement among nations to remedy the evil; the result was negative, and eventually the leading nations of the western world adopted the gold standard, under the conviction that greater stability of the value measure could thus be attained; most of the other nations adapted their money systems to this change, China being today the only noteworthy exception.

This important step was greatly facilitated by the great increase in the world's gold supply during the last decade, when fully $2,300,000,000 were added to the stock available for money purposes. The far reaching effect of this will be discussed presently.

Money is obviously indispensable to human activity, industrially and commercially; it is necessary that we have tools of exchange of some kind. It is equally important, however, that the provision of such tools be made in a manner which shall permit the proper operation of the value-measuring function of money. This is regulated in a large degree by the volume of the money supply compared with the demands therefor, and is reflected in the *interest rate* (the index of the worth of money) and in *prices.*

We hence naturally find in the economic history of the world periodic struggles against a diminution of the money supply; for the race has learned that absolute dearth of money means distress. The period known as the Dark Ages in Europe was also the period of great money dearth following the disappearance of a large

part of the stock of metals after the lavish era of the Romans. The evil was not entirely removed until after the discovery of America and the transfer of gold and silver from its mines and hoards.

To supplement the metallic supply the important device of paper representatives of money was evolved. (Discussed in detail under CURRENCY, q.v.) For practical purposes this dates from the general introduction of banks, although used to some extent much earlier. Having in mind that such paper, as long as acceptable, is also money, and that the volume of money is an important factor in the measuring of values, the utility of this device, where it actually increased the available supply of good money, cannot be overestimated. The evolution of credit, with the addition of bank notes, checks and drafts, as instrumentalities, was as great a boon as that of the steam engine and its many improvements. This is true notwithstanding the very frequent occurrence of the misuse of the credit function in over-issues of notes and the consequent fraud of depreciated, fluctuating currency imposed upon the people.

The maintenance of credit instrumentalities upon the plane of 'good money' depends upon the holding of adequate reserves of basic money—gold; paper is acceptable so long as people believe that the gold represented can be had; thus the available supply of yellow metal is still the main reliance. The conditions of the demand, and hence the use, are, however, factors of prime importance. Base metal coins have no substantial intrinsic value, yet the absolute need for them in daily life makes them acceptable; so, too, silver and paper. Furthermore, demand is stimulated by an ample supply of good money, which causes low interest rates, encouraging enterprises; the resulting business activity then creates new demands for money and if conditions permit provision of an adequate supply, prosperity continues; usually also prices and wages rise and these again call for more money. It is when the expansion of the money supply has reached its limit that a check upon prosperity is likely to follow. Then demands slacken and the supply becomes redundant; money becomes worth less, because not used; prices and wages fall and 'times become hard.'

Stability of money being dependent upon the adjustment of supply to demand, the question arises, Can this be regulated? To do so it is requisite that the volume of money be susceptible of automatic increase or decrease—elasticity. The two forms of credit money should provide this feature; check-money being dependent as to its volume upon *deposits* in banks and as to its use upon *loans* which express demand, responds very fairly to the requirement; paper money in the shape of notes and silver should also do so, but does not always. Gold is an elastic form to this extent: that if conditions in one

place cause it to be valued lower than at other places (as shown by the relative interest rates), it will move to the place where it can earn more. (See under EXCHANGE.) The adjustment is hence to be affected through the credit-note form of money. France and Canada have apparently reached the highest point of stability; for in the former country a 3 per cent. rate of interest was maintained for seven years and in Canada there are only slight fluctuations, because the bank-note supply is very elastic in volume.

In the following table there is presented, in millions of dollars (and in dollars per capita), the amount of money in the world and separately for Europe and the United States, comparing 1896 and 1906, as reported by the director of the United States mint; also estimates of the banking power, which includes as the chief item the deposits available:

THE WORLD'S MONEY SUPPLY—Million Dollars.

	The World.		Europe.		United States.	
	1896.	1906.	1896.	1906.	1896.	1906.
Gold	4,144	6,483	3,048	4,182	672	1,421
Full-tender silver	3,617	2,107	700	480	556	568
Subsidiary silver	620	1,069	506	802	76	119
Uncovered paper	2,558	3,556	1,496	1,028	424	582
Total	10,939	13,215	5,750	6,492	1,755	2,690
Per capita	$8.62	$9.98	$14.02	$15.50	$24.03	$32.02
Bank power	23,000	39,000	12,600	18,000	7,500	16,500

Uncovered paper signifies the excess of notes over metal reserves. The reduction in volume of full tender silver in the table for the world is due to the fact that the stocks of the silver-using countries are in 1906 estimated at only one-half of the nominal or face value. In Europe a large part of former full tender coin is now subsidiary. The notable increase has been in the gold supply. This has made it possible to increase credit money enormously, stimulating business everywhere and causing conditions of unprecedented prosperity.

In the systems of the several nations the coins vary considerably in weight and fineness, hence in value; but the rating for gold is practically universal at a price expressed in our money at $20.67½ per ounce of pure metal. The equivalent of the chief coins of the world are given under EXCHANGE. Silver is rated in the United States for coinage into dollars at $1.29 per ounce of pure metal; the ratio being about 16 to 1; the commercial ratio valued silver at about one-half (ratio 32 to 1) for many years, although a slightly higher ratio has prevailed for about a year; hence silver coins of the old types are reduced in value practically one-half. But where the weight of these coins is greater than the ratio of 32 to 1 the coin is exported when the price of silver rises. MONETARY SYSTEMS: the world's systems of money are classifiable today into those where gold alone is the

standard, those having the gold standard but with silver as full legal tender money (formerly double standard), those having a theoretic gold standard with silver actually performing the chief money functions at an arbitrary ratio, those having the silver standard, and those which unfortunately have depreciated paper currency. All use bronze coin for the smallest divisional pieces; very many also employ nickel for the minor coins; and most have silver pieces at a lower ratio than for standard silver coins for subsidiary (change) purposes. Subsidiary and minor coins have generally a very limited legal tender power, the former about $10, the latter about 25 cents. Again systems are classifiable according to the size of the units; those having the pound system, approximately a $5 unit, those having the dollar system, those having, since the fall in silver, the half-dollar unit, and those having the franc or about 20-cent unit. The smaller units are rarely coined, as the pieces would be too little for practical use. *Great Britain* is the originator of the pound system; its unit, £, was formerly, prior to 1200 A.D., a pound of sterling silver (.925 fine); but in the numerous changes it came to be a gold piece containing 113.0015 grains pure gold; coinage is at .916⅔ fineness. Silver is subsidiary only since 1815, the *crown* (5 *shillings*) weighing 436.36 grains, .925 fine. Paper currency is provided by banks only. The equivalent of the unit is $4.86⅔. £ = 20 *shillings*, each of 12 *pence*, of 4 *farthings*. *British Possessions: Australia, South Africa* and most of the insular possessions have the identical system. In some of the *British West Indies* and in *British Honduras* the dollar system of the United States is also used; and in *Canada* the money used is dollars and cents, although the £ is legal tender. Here also the paper currency is issued in part by the government and in part by the banks. *Newfoundland* has a dollar slightly better, worth $1.014. *British India*, while having the £ rated at 15 *rupees*, actually uses the old silver system; the arbitrarily fixed value of the *rupee* is 32.4 cents. It is divided into 16 *anna*, each of 4 *pice* of 3 *pie*. Government notes only are used. *Ceylon* has the same system, but the *rupee* is divided into 100 cents. *Straits Settlements* has the old British silver dollar (worth about 50 cents), but is shaping its system upon the model of India with a fixed value to this dollar of about 29 pence, and government notes. *Hong Kong*, because of its proximity to China, has still the British silver dollar, fluctuating in value about 50 cents; it contains 416 grains of silver .900 fine, and is divided into cents. Bank notes are provided. The unorganized African possessions, Borneo, etc., use chiefly bronze pieces. *France:* the originator of the *franc* system, has a unit worth 19.3 cents; the gold piece of 5 francs contains 24.89 grains .900 fine, value 96.5 cents. Silver pieces of 5 francs are full legal tender, of 385.8 grains .900 fine;

smaller pieces are only .835 fine; the franc is divided into 100 *centimes*. Paper currency is furnished solely by the Bank of France. *French Possessions: Algiers* and *Tunis* have the franc system and a local bank issues notes. So also the *French West Indies* and *Guiana*. *Madagascar* is provided with French coins, and other African possessions use them and large quantities of bronze pieces. *Indo-China* has a silver dollar, called *piaster*, of 416⅔ grains .900 fine, fluctuating value about 50 cents, divided into 200 *sapeques*. A bank issues notes. For many years the French system has been used by four other countries next named and has been adapted by the several others following. *Belgium: franc*, 19.3 cents, divided into 100 *centimes;* notes issued by one bank. *Switzerland: franc*, 19.3 cents, divided into 100 *centimes;* until 1907 notes were furnished by 34 banks; now one central bank has the exclusive right. *Italy: lira*, 19.3 cents, divided into 100 *centimes;* three banks and the government issue notes. *Greece: drachma*, 19.3 cents, divided into 100 *lepta;* government and bank notes depreciated; present gold premium about 33 per cent. *Spain: peseta*, 19.3 cents, divided into 100 *centimos;* one bank issues notes; depreciated paper standard; gold at about 14 per cent. premium. *Bulgaria: lev*, 19.3 cents, divided into 100 *stotinki;* government and bank notes, slightly depreciated. *Servia: dinar*, 19.3 cents, of 100 *paras;* one bank issues notes; not always at par. *Roumania:* gold standard; *lei*, 19.3 cents, of 100 *bani;* one bank issues notes. *Portugal: milreis*, of 1,000 *reis*, worth $1.08, the unit; gold standard; milreis contains 27.369 grains .916⅔ fine; silver subsidiary, milreis of 385.8 grains, also .916⅔ fine; one bank issues notes, depreciated; gold premium about 3½ per cent; £ is legal tender at 4½ milreis. For *Mozambique* and *African* and *Asiatic* possessions special coins are furnished. *Germany: mark* = 23.8 cents; gold standard; theoretic unit 6.15 grains .900 fine; silver subsidiary, 5 marks = 428⅔ grains .900 fine; notes issued by the government and by 8 small banks, in small amounts; chief issue by one central bank. *Mark* = 100 *pfennige*. For its possessions, chiefly African, rupees and a large amount of bronze coins, *heller* and *pesas*, are coined. *Austria-Hungary:* new system 1892; *krone* = 100 *heller;* gold standard; value of unit 20.26 cents; theoretic gold content 5.33 grains .900 fine; smaller pieces .835 fine; one bank issues notes. *Netherlands: florin* or *guilder* = 40.2 cents; full legal tender silver in use; *rixdaler*, 2½ florins, 385.8 grains .945 fine; theoretic gold unit 10.37 grains .900 fine; smallest silver, subsidiary, only .640 fine; florin divided into 100 cents; one bank issues notes. Identical system for *Java, Dutch Guiana* and other colonies. *Russia:* gold standard; *ruble* of 100 *copecks* = 51.45 cents; gold ruble contains 13.276 grains .900 fine; subsidiary silver ruble 308.58 grains .900 fine; smallest pieces are only .500 fine; notes issued

by one bank owned by the government. *Finland: markka* of 100 *penni* = 19.3 cents (same as franc); gold standard; one bank issues notes. *Scandinavian Union, Sweden, Norway* and *Denmark: krone* = 100 *ore,* value 26.8 cents; gold standard; unit is theoretically 6.91 grains .900 fine; subsidiary silver krone 11.74 grains .800 fine; smaller pieces .600 and .400 fine. Single banks issue notes, the one in Norway owned by the government. *Danish West Indies* have a mixed system. *Turkey:* £T = $4,396, divided into 100 *piasters* of 40 *paras;* gold standard nominal; unit, also called *lira,* is 111.366 grains gold .916⅔ fine; silver .830 fine; 20 piaster piece 371.225 grains; one bank issues notes. *Egypt:* £E = $4.943, divided into 100 *piasters* of 10 *ochr-el-guerche* each; gold standard, unit being 131.175 grains .875 fine; silver 20 piaster piece is 432.106 grains .833⅓ fine: a British chartered bank issues notes; British, French and Turkish gold coins are legal tender. *Morocco: piaster* or *rial* of silver = 46.8 cents, but variable; weight 385.8 grains .900 fine; divisional pieces .835 fine; French system approximated; no paper currency. *Tripoli: mahbub* of silver = 20 *piasters,* same as Turkish but fluctuating. *Zanzibar* has nominally a dollar system; but, as in *Abyssinia* and *Eritria, rupees* and other coins, especially *talari* (Austrian trade dollars), of silver, fluctuating at about 48 cents, are largely used. *Persia:* silver standard; unit *kran,* 71.06 grains .900 fine, fluctuating value about 8½ cents; gold piece is *toman* 43.98 grains .900 fine, value $1.70; *toman* = 10 *krans* of 20 *chais;* one bank issues notes. *Arabia* has also mixed coins, rupees largely used; *Mauritius, Afghanistan, Burmah, Baluchistan,* also have rupees; in *Turkestan* and *Siberia* rubles come into play. *Siam* has now a gold standard with silver currency; the *tical* (of 4 *salung* each of 2 *fuang*) = about 30 cents; government paper is to be used exclusively. *China: tael* of 1,000 *cash;* silver standard; tael fluctuating at about 80 cents; there are many kinds of taels varying in weight; a projected coinage of dollars and cents has not yet been carried out; Mexican and British dollars are also used; the Hong Kong and other banks issue notes; gold standard under discussion. *Japan:* now gold standard; *yen* = 100 *sen* of 10 *rin* each; unit is theoretically 12.86 grains .900 fine, value 49.8 cents; silver is .800 fine; one bank issues notes. In *Korea* the same *yen* system has now been introduced by the Japanese. *Philippines:* the United States has introduced the gold standard with arbitrarily fixed silver currency; *peso* (theoretic) of gold = 12.9 grains .900 fine, value 50 cents; silver peso was 416 grains .900 fine; now reduced to .700 to prevent exportation; arbitrary value 50 cents; divided into 100 *centavos;* government issues silver certificates and one bank issues notes. *Brazil: milreis* of 1,000 *reis* = 54.6 cents; gold standard, unit is theoretically 13.83 grains gold .917 fine; silver milreis 196.76 grains .917 fine;

actual money depreciated government notes and nickel coin; gold premium 100 per cent., but falling. *Uruguay:* gold standard; *peso* = 100 *centavos,* value $1.034; unit contains 26.188 grains .916⅔ fine; silver peso same as 5-franc piece, 385 grains .900 fine; several banks, some with foreign charters, issue notes. *Argentina: peso* = 100 *centavos;* depreciated paper standard at fixed rate for gold: 127.27 per cent. premium; gold peso would be 24.89 grains .900 fine, value 96.5 cents; the silver one the same as the 5-franc piece; notes are all issued by the government. *Paraguay: peso* of 8 *reals* or 100 *centavos;* depreciated government paper standard; gold premium about 800 per cent.; theoretic coin the same as Argentine. *Chile: peso* = 100 *centavos;* gold standard, but depreciated paper; gold premium about 8 per cent.; gold peso, theoretic, is about 9.25 grains .916⅔ fine, value 36.5 cents; silver peso is 308.65 grains .835 fine; government issues notes. *Peru:* gold standard, no paper; *libra* (£P) of 123.27 grains .916⅔ fine = $4.86⅔; subsidiary silver, *sol* (and divisions) 385.8 grains .900 fine; *libra* = 10 *sols,* and the latter = 10 *dineros. Ecuador:* nominally gold standard; *sucre* of 5 *pesetas,* or 10 *reals,* or 100 *centavos;* contain 385.8 grains silver .900 fine; gold piece is 10 *sucres,* 125.56 grains .900 fine, value $4.86⅔; bank notes are used. *Bolivia:* silver standard, *bolivianio* of 100 *centavos* is 385.8 grains .900 fine (like 5-franc pieces), fluctuating value about 48.7 cents; smaller coins exact divisions; bank notes are used. *Colombia:* new system; gold standard; *peso* 25.8 grains .900 fine, value $1; divisions are 5 *pesetas,* or 10 *reals,* or 100 *centavos;* silver half peso is 425¾ grains .900 fine; enormous amounts of depreciated paper in use; gold premium has been as high as 30,000 per cent.; a central bank is reorganizing the currency. *Venezuela: bolivar* = 20 *centavos,* value same as franc, 19.3 cents; *venezolano* of 5 *bolivars* is 24.98 grains gold .900 fine, value 96.5 cents; bank notes are in use. *Panama: balboa* of 2 *pesos* each, divided into 100 *centavos;* gold standard; unit is 25.8 grains .900 fine, equal to $1. *Costa Rica:* gold standard; unit is *colon* of 12 grains .900 fine; value 46.5 cents; divided into 100 *centimos;* bank notes are used. *Guatemala, Nicaragua, Honduras, Salvador: peso* of silver, same as 5-franc piece; fluctuating value 46.5 cents; bank and government notes in the two first named, at a large discount; bank notes in the two latter, well sustained. *Mexico:* recently adopted gold standard with silver currency; gold *peso* of 100 *centavos* = 26.11 grains .875 fine, value 49.1 cents; silver peso (old Mexican dollar) 417.8 grains .902.7 fine; banks issue notes. *Cuba:* Spanish system, *peseta* 19.3 cents, divided into 100 *centimos;* no paper issues; United States money largely used; as also in *San Domingo,* where the dollar has been legally established. *Porto Rico,* of course, has the system of the United States. *Haiti:* nominally gold standard with

gourde for unit; is 24.89 grains gold .900 fine, value 96.5 cents; silver *gourde* same as 5-franc piece, 385.8 grains .900 fine; smaller pieces are .835 fine; depreciated government paper standard; gold premium 400 to 600 per cent. *United States:* gold standard with full legal tender silver; unit, *dollar* of 100 *cents,* each of 10 *mills;* in gold 25.8 grains, in silver 412½ grains, subsidiary at 385.8 grains to dollar, all .900 fine; government notes, gold certificates, silver certificates and bond-secured bank notes are used; in the United States prior to their independence the British system, somewhat modified by the Spanish, prevailed; when the new government was organized under the constitution, in 1789, steps were at once taken to formulate a distinct system; the Spanish silver dollar being more nearly the actual unit was used as a model and a coin of 416 grains .8924 fine, was provided for by the law of 1792 as the unit; in gold the dollar was to be theoretically 27 grains .916⅔ fine, thus giving a ratio of 15 to 1 between the metals; divisional silver pieces were made full legal tender as well as the chief ones; in 1834, the ratio was altered by changing the weight and fineness of the gold coin, and a correction in 1837 finally gave the ratio of 16 to 1 (accurately 15.988 to 1), which still exists; the theoretic gold dollar is 25.8 grains .900 fine; the silver dollar was made 412½ grains, also .900 fine; in 1853, divisional pieces were reduced in weight about 7 per cent. to prevent exportation; in 1873, the silver dollar coinage was discontinued, but resumed on government account in 1878, $2,000,000 of silver being purchased monthly; in 1890, purchases were doubled; in 1893, the purchase was suspended; by 1905, all the silver had been coined and no dollars have since been struck; the coins are as follows: Gold: $20, $10 (*eagle*), $5 and $2.50; formerly also $3 and $1, both discontinued in 1892; silver: $1, 50, 25 and 10 cents; formerly also 20, 5 and 3 cents, to 1873; minor coins are nickel (copper 75 per cent., nickel 25 per cent.), 5 cents, formerly also 3 cents, and 1 cent, bronze (95 per cent. copper, 5 per cent. tin and zinc), 1 cent, formerly also 2 cents, and prior to 1857 both 1 cent and ½ cent were coined of pure copper; paper currency in the period 1791 to 1811, state bank notes and United States bank notes; 1811 to 1816 state bank notes, generally depreciated; 1816 to 1836 again United States bank notes added; 1836 to 1864 state bank notes periodically depreciated; 1862 government notes introduced with legal tender power, depreciated to 1879; 1864 bond-secured bank notes also depreciated, to 1879, except gold issues on Pacific slope; 1865 gold certificates (renewed 1882 and 1900); 1878 silver certificates; 1890 treasury notes, since 1893 gradually converted into silver certificates; amount in use 1907, July 1: United States legal tender notes $346,681,016; treasury notes $5,988,000; silver certificates $475,777,000; gold certificates $678,244,869; national bank notes $603,788,690; total

paper $2,110,479,575; of gold there was $1,602,014,642; silver dollars $562,263,530; subsidiary silver $130,560,-377; of the aggregate supply of $4,405,318,124, there was gold and silver represented by certificates $1,154,921,869; the treasury had $236,953,998; leaving outside $2,914,-342,256, or $33.86 per capita; our 'supplementary money,' represented by deposits in bank subject to check (excluding, therefore, those in savings banks), is estimated at $9,000,000,000, or more than $105 per capita, having increased from about one-half that amount since 1899; in other words, the expansion, unquestionably stimulated by the increased gold supply, has been approximately 100 per cent. in eight years; the growth in the volume of business, as represented by clearing-house operations, has been somewhat less; the volume of loans, indicating the demand for money, has also doubled; and the record of prices indicates a rise of from 90½ to 108, a change of 17½ points, or nearly 20 per cent.

Money Market: the money market is not, as might be surmised from the term, a distinct place where money is bought and sold; it signifies the condition of the money supply as indicated by the loans, and interest or discount rates. These rates are determined by the bankers, and there are brokers who carry out the loan transactions; but they do not congregate at a given place as other brokers do.

Since money has the tendency to flow to the place where it can earn most, the money market is in one respect international; and in this respect it is dominated by London, where exists the greatest accumulation of capital; although Paris, Berlin, and New York are also very important factors. The general view of the international movement of money is given under Exchange; it remains to be said, however, that the moving force depends very largely upon the status of the reserve of gold in the Bank of England against its deposit liability, which it aims to hold above 40 per cent. When the reserve falls the discount rate rises, and this is substantially a bid for gold. If at the other centres it is desired to prevent gold from going out to England, rates must be advanced or the reserves protected otherwise. When that is done the bank can only get the new gold coming from the mines, for the greater part of which London is the natural market.

In the United States bank loans are classifiable into mortgages, ordinary commercial discounts of promissory notes and drafts, time loans secured by collateral of bonds and stocks, and demand loans payable 'on call' secured in the same manner. It may be said generally that all of the last mentioned class, and most of the secured time loans also, are made to stock exchange operators.

There is a distinct tendency to the accumulation of money in the chief center, New York, even though rates

are normally lower there than at interior points. This is stimulated by the fact that the banking laws favor the practice of interior banks keeping one-half or more of their resources in the centre; by the payment of interest on these interior bank balances by New York banks; by the prospect of higher rates when speculation in stocks is active; and finally the absence of funds from home enables interior banks to maintain a higher rate of interest on local loans.

Banks in New York hold 25 per cent. reserve against deposits; every loan is in effect a deposit, since the sum loaned is placed to the credit of the borrower, against which he may draw checks. Thus the loaning capacity is measured by the reserve status.

The stock market offers a practically continuous opportunity for loaning money; it is hence natural that the country's surplus funds should flow thither. The 'call loan' rate is thus the index of the volume of the surplus funds available. The demand for money from the other sources fluctuates very considerably, and practically by seasons; thus in the summer and fall, when the crops are to be garnered and moved, more money is needed than in the other half of the year; the extra sum is estimated at about $150,000,000. It is during the slack business season that money begins to accumulate in New York, and the surplus is frequently so large, and hence the competition to lend it out so great, that the rate for money 'on call' falls abnormally low, 2 per cent. being usual and a minimum of ½ per cent. occurring at times.

This cheap money stimulates speculation, and if continuous, overspeculation is certain to follow, prices of stocks rise and a 'bull market' is on. When later in each year the interior banks need their funds, the city banks must call their loans and frequently stocks must be sacrificed; this selling lowers prices of stocks and a 'bear market' is caused. Stringency is sometimes so acute as to drive money to 25, 40, 60 and 100 per cent.; the record high rate is 186 per cent., i.e., the legal 6 per cent. and a commission of ½ per cent. per day, in order not to infringe the usury law. Such a condition is frequently followed by panics. While these extreme rates pertain only to call loans, the rates for other loans are also affected thereby. Manifestly, however, the rising rates tend to restrain speculation.

When very low rates prevail it is logical that gold should tend to go abroad, money being then apparently in excess here; when the high rates are asked gold is frequently imported or loans are made abroad by international banks which accept the collateral. Most frequently, however, the government lends its aid; for under our fiscal system the federal treasury accumulates large surpluses of cash which are thus drawn from the channels of trade; under the law these may, however, be returned to use by depositing in banks, properly secured by bonds.

Obviously, $20,000,000 placed in banks helps materially, as it serves as reserve for at least $80,000,000 in loan deposits.

The index of the existing or the prospective money market in New York city is the statement of the condition of the banks, which is published weekly and observed by all interested in the rates for money. In recent years it has not been so important a guide or indicator, because so large a volume of the business of loaning is now done by trust companies which make no such reports. Still the 'bank statement' has not lost its influence and is regarded as a factor only second to that of the Bank of England. The New York statement is, however, one of averages for the week, not the actual condition upon the day it is issued.

In the following table the chief elements of the bank statement and deductions therefrom are given for a recent critical period in the New York money market (in the spring of 1907); the figures represent millions of dollars:

	Week ending				
	Mar. 9.	Mar. 16.	Mar. 23.	Mar. 30.	Apr. 6.
Loans	1,067	1,054	1,050	1,056	1,063
Deposits	1,020	1,004	1,002	1,020	1,037
Cash reserve	257	254	255	268	278
Reserve required (25% of deposits)	255	251	250	255	259
Surplus reserve	2	3	5	13	19
Call money rates (per cent.)	6-6¼	5¼-25	6-5	14-5	4½-2½

The situation on March 9 was so critical, the reserves having fallen so nearly to the limit, that in the following week the rate for call loans was raised materially; this caused a diminution of loans and of the deposit liabilities, hence also of the reserve required. The conditions continued critical in the following week, although rates did not go higher than 6 per cent. In the week ending Mar. 30 money rose to 14 per cent.; but the situation was relieved by the deposit with the national banks of considerable sums of government money by the treasury; this served to restore the cash reserves and increase the surplus, whereupon rates promptly fell again; call loans were made in the week thereafter as low as 2½ per cent.

During the period nearly one-half the banks actually carried less than 25 per cent. cash reserves; in some instances very much less. The stock market showed very heavy declines in prices, sufficient to be recorded as a 'slump.'

Rates for money at interior points are ordinarily (and normally) considerably higher than those in New York, showing, according to distance from centres, variations all the way from 4 per cent. to 12 per cent.; even 15 per cent. and more is sometimes exacted as a customary charge in the places least sufficiently provided with banking facilities. See GOLD; SILVER; CURRENCY; COINAGE; MINT; BULLION; LEGAL TENDER; BANK NOTES; BONDS;

CONTINENTAL CURRENCY; BIMETALLISM; FINANCE; STOCKS; CLEARING HOUSE; BANK—BANKING; EXCHANGE; COMMODITY EXCHANGE; FOREIGN EXCHANGE; CURB MARKET; TRUST COMPANIES; SAVINGS BANKS; DEBTS, NATIONAL; etc. See also NUMISMATICS.

MONEY, PAPER: a money issue of a nation or government; a stamped sheet of paper, silk, linen, or parchment, given an official value and used as a medium of exchange. Although coins were used before paper money, the latter was known among the ancients. Corn, cattle, iron, leather, cocoa, shells, tobacco, and other commodities were all, in point of fact, used as money, in different ages and different countries, but they have long ceased to be so used, by commercial nations. The scarcity of gold and silver, the need of bills of exchange, and the want of a money more convenient for the individual to carry, and lastly, the issuance of government credits forced on bankrupt nations, brought about the use of paper money in European countries, and Colonial America early adopted this medium of exchange from the English.

Provincial Paper Money.—In the earliest days of America paper money was first issued by Massachusetts in 1690. The object was not to supply any supposed want of a medium for trade, but to satisfy the demands of some clamorous soldiers. Other issues were subsequently made, partly with a view of defraying the expenses of government, and partly with a view of making money plenty in every man's pocket. The ill-judged expedition of the Carolinas against Saint Augustine, in 1702, entailed a debt of 6,000 pounds on that colony, for the discharge of which a bill was passed by the provincial assembly for stamping bills of credit, which were to be sunk in three years by a duty laid upon liquors, skins, and furs. For five or six years after the emission, the paper passed in the country at the same value and rate as the sterling money of England. To defray the expenses of an expedition against the Tuscaroras, and to accommodate domestic trade, the legislature of South Carolina established a public bank in 1712, and issued 48,000 pounds in bills of credit, called bank-bills, to be lent out on interest on landed and personal security, and to be sunk gradually at the rate of 4,000 pounds a year. Soon after the emission of these bank-bills, the rate of exchange and the price of produce rose, advancing in the first year to 150, and in the second to 200 per cent. By the year 1731 the rate of exchange rose to 700, at which it continued with little variation upward of 40 years. In the year 1723 the province of Pennsylvania made its first experiment of a paper currency. It issued, in March, 15,000 pounds, on such terms as appeared likely to be effectual to keep up the credit of the bills. It made no loans but on land security, or plate deposited in the loan office; obliged the borrowers to pay 5 per cent. for the

sums they took up; made its bills a tender in all payments, on pain of confiscating the debt, or forfeiting the commodity; imposed sufficient penalties on all persons who presumed to make any bargain or sale on cheaper terms in case of being paid in gold or silver; and provided for the gradual reduction of the bills, by enacting that one-eighth of the principal, as well as the whole interest, should be annually paid. These early specimens of provincial paper money were large notes, printed from copper-plates, having engraved borders on three sides. The inscriptions on the bills were in type, with arms or motto engraved in the left side centre. The signatures of the province officials were always signed in red ink.

Continental Money.—The first issue of paper money under the authority of the continental congress was dated 1775, May 10, but the notes were not actually placed in circulation until the August following. On May 31, 1781, the continental bills ceased to circulate as money, but they were afterward bought on speculation at various prices, from 400 for one, up to 1,000 for one. The value of continental paper was not the same in different parts of the country. The exchange was, for example, at 35 for one in New England, New York, the Carolinas, and Georgia, and at 40 for one in Pennsylvania, New Jersey, Delaware, Maryland, and Virginia. An account taken from the books of merchants in Virginia shows that the depreciation there regularly followed that in Philadelphia, though, toward the close, it sometimes lagged a month or more behind. Thus when exchange was in Philadelphia at 100 for one, in 1781, Jan., it was in Virginia at 75 for one. As late as 1781, May, speculations were entered into at Philadelphia to purchase continental money at 225 for one, and sell it at Boston at 75 for one. It is worthy of remark that the depreciation of continental money never stopped the circulation of it. As long as it retained any value at all it passed quick enough; and would purchase hard money or anything else, as readily as ever, when the exchange was 200 for one, and when every hope, or even idea of its being ultimately redeemed at nominal value had entirely vanished. The facility of raising ways and means, in the early part of the revolutionary war, by issues of paper, led to much extravagance in the commissary department, and prevented the establishment of a sound system of finance.

Connecticut.—Under date of 1762, Mar. 4, Connecticut issued a series of colonial notes of the following values: 9 pence, 1 shilling, 2 shillings and 6 pence, and 10, 20, 30, and 40 shillings. There were 19 regular issues, the last being dated 1780, July 1. There were also three single bills in the nature of treasury notes, the last dated 1791, Jan. 26. Over 100 different bills were issued by this colony. The smaller values were for 2, 3, 4, 5, and 7 pence, issued 1777, Oct. 11. In Connecticut the 6 shilling

bill was not infrequently raised by clever counterfeiters to the value of 10 shillings.

Delaware.—In this colony paper money was issued as early as 1735. One value only of these notes has been preserved to us, although doubtless many others were in circulation; the denomination is 10 shillings. The designs of the early issues are all about the same, a type body with a border of the same and wood cut of the royal arms. On Feb. 28, 1746, a new series was issued of the same general design, but noteworthy from having been printed by the celebrated Benj. Franklin and his partner, D. Hall. On bills of this colony we first get the information that 'To Counterfeit is Death,' which is repeated in every possible form, ''Tis death to counterfeit,' 'To counterfeit is death,' 'It's death to counterfeit this bill,' 'Death to counterfeits,' etc. The 2 shilling 6 pence bill of 1776, Jan., issue is adorned with pillars, and probably to show that the edifice supported can stand any sort of usage, one is placed upside down. The last series issued, 1777, May, contains bills from 3 pence to 20 shillings, and changed the cut of the royal arms for that of the state. Sixty bills emitted by this colony are known.

Georgia.—The earliest bill printed in Georgia was of the value of 2 shillings 6 pence, and was dated 1749, Mar. 7. The Georgia bills were printed on one side of white paper and were usually made attractive by copper-plate vignettes printed in various colors. The vignettes represented figures of liberty, soldier, deer, hog, rattlesnake, palmetto tree, etc. The last issue was dated 1786, Oct. 16. There are over 110 varieties from 3 pence to 5 pounds.

Maryland.—The first bill of this colony is dated 1740 and of the value of one shilling. This was followed by a series of five values in 1748, and from then a regular succession of issues until their final extinction in 1781. The design of the early issues may be described as the arms of Lord Baltimore supported by two men in the costume of the day, one with a fish and the other with a spade. This is differently placed on the various bills. The lettering or form of contract is in the following words, 'This indented Bill of Eight Dollars shall entitle the bearer to receive Bills of Exchange payable in London, at the Rate of Four Shillings and Six Pence Sterling per Dollar for the said Bill, according to Directions of an Act of Assembly of Maryland, Dated in Annapolis, this 1st day of January, Anno Domini 1767,' followed, of course, by two signatures. The quaint idea of scalloping the end of a legal document to show that it has been prepared with due care and thought, and not cut off in a hurry, is carried out on these bills. In some values even the word 'indented' is printed in a wavy line, and that there should be no mistake as to what is meant by a dollar, a minute representation of a Spanish dollar is inserted in the text. The values of the Maryland bills

were 3, 4, 6 and 9 pence, and so on up to 3 pounds. There were over 100 varieties issued.

Massachusetts.—Prior to 1775, some 13 examples of paper money were issued in this colony. One of these is a copper-plate engraving said to have been the work of the noted patriot Paul Revere, of Boston. The series was issued by order of the general assembly of the colony of Massachusetts Bay 1775, Dec. 7. The reverse of these bills bears the figure of a man in continental dress, with a drawn sword in one hand and a copy of the Magna Charta in the other, above 'Issued in defence of American Liberty,' below in Latin, 'He seeks by the sword calm repose under Freedom.' The series of 1776, Oct. 16, repudiates the title of colony for that of state. Coin must have become scarce, as more than half of the denominations are under 1 shilling. The codfish was the principal design on these bills. The next issue of eight values was of interest-bearing notes which are guaranteed by the United States. Upward of 135 bills were issued by Massachusetts.

New Hampshire.—The design of the New Hampshire bills was usually the British arms with inscriptions in elaborate frames. The earlier issues were type-set. About 60 varieties are known.

New Jersey.—The issues in this colony began in 1724, Mar., and continued regularly to 1786, May. In shape the bills were a small, narrow oblong. The high value notes were printed in blue and red. In 1781, the royal arms became the arms of the state, the type reading as follows: 'State of New Jersey, Five Shillings. This bill shall pass for Five Shillings agreeably to an Act of the Legislature of this State, passed the ninth day of January, One Thousand Seven Hundred and Eighty-one.' An entire collection of New Jersey bills would number 185.

New York.—The first bill issued was in 1709, and then followed a series of four dated 1737, Dec. 18. In the next issue the form reads: 'By a Law of the Colony of New York this Bill Shall Pass current for Three Pounds New York the 20th April 1756.' A set of United States guaranteed notes appeared 1780, June 15.

North Carolina.—The earliest notes were dated 1748, and upward of 120 varieties were printed up to 1780. The most of the North Carolina bills bore motto inscriptions, such as 'Virtuous Councils the Cement of States'; 'A Righteous Cause the Protection of Providence'; 'A Lesson to arbitrary Kings and wicked Ministers'; 'Liberty and Peace the Reward of Virtuous Resistance'; 'Persecution the Ruin of Empires'; 'Union of Hearts the Strength of Interests'; 'American Virtue Triumphant'; etc.

Pennsylvania.—The earliest known bill was dated 1723, Aug. 10, and was printed by Benj. Franklin. The general style of the notes is the same as used in Delaware,

bearing the royal arms, or in 1756 those of Wm. Penn, with his motto, 'Mercy Justice.' In 1764, a curious notion was adopted of spelling the name of the colony differently on each bill, thus on the series we find Pennsylvania, Pensylvania, Pennsilvania, and Pensilvania. On some of the notes issued in 1771 is the signature of Francis Hopkinson, and on the bills of April of the following year that of John Morton, both signers of the Declaration of Independence. In 1777, the shape of the bill changes to the oblong form, and the arms of Pennsylvania take the place formerly devoted to those of Great Britain. This series are found both in black, and red with black type. In 1780, a set guaranteed by the United States, of the same design as issued for other states, was put in circulation, and on Mar. 16, 1785, the last of the series saw the light, the denominations running from 3 pence to £4, 16 values in all. The varieties issued by this colony were over 250.

Rhode Island.—The paper money of Rhode Island was similar in design and value to that of Connecticut. The first issue was in 1715 and the last in 1786. There were about 75 varieties.

South Carolina.—There were various notes issued in this colony from 1712 to 1770. The bills dated 1776, Mar. 6, were supposed to have the value of silver; equivalent in currency is given thus, 6 Spanish milled dollars = £9 15s. currency. In 1779, appeared the handsomest notes heretofore used in the country, the backs of the $50, $70 and $90 bills representing Atlas, Prometheus and Hercules being especially noteworthy. The total number of bills for South Carolina was 105.

Vermont.—In this colony there were but two series, the first issued in 1781, Feb., is an ordinary type-printed note, with engraved border on three sides, with the state seal about the centre. This consists of a pair of scales and a chain of fourteen links (the only instance where the number is carried above the original thirteen) enclosed in a circular band inscribed 'Vermont Calls For Justice.' The second issue are in the form of treasury notes, the amounts being filled in with ink.

Virginia.—The first issue for this state was in 1755. The notes are of two varieties, the first a fine, large bill after the English style, and then something between a draft and a bank-bill, being probably made to fill a pressing want. The bills are copper-plate engravings, filled out in ink. On the issue of 1775 are the royal arms of Virginia in an engraved frame. The lettering reads: 'Three Pounds Current Money of Virginia Pursuant to Ordinance of Convention Passed 17 July 1775.' The following year introduces the 'sic semper tyrannis' in place of the arms.

Bank Notes.—From the revolutionary period to the days of the civil war and to the present time, many issues of paper money have been made by the government, and

by national, state and local banks. See BANK—BANKING; MONEY; CONTINENTAL CURRENCY.

Confederate Paper Money.—During the civil war the southern states in secession issued millions of dollars in paper money, beginning in 1861, July, with bills of from $5 to $100. On these were designs of the Confederate flag, a train of cars, cotton bales, etc. In 1861, Sep., appeared at least 50 varieties of bills in value from $5 to $100. They were of various designs. A $20 bill showed a head of Alexander H. Stephens in one corner; a $10 bill pictured General Marion offering a breakfast of sweet potatoes to a British officer. Portraits of Davis, Hunter, Memminger, Stephens, Mrs. Pickens, Mrs. Davis, Benjamin, Gen. Jackson, and others, appeared on the high value notes. There was an issue of $1 and $2 bills in 1862, and in 1863, Apr., appeared a series in value from 50 cents to $100. Some of these bore designs of the capitol buildings at Richmond, Nashville, Montgomery, etc. The last issue of bills from 50 cents in value to $500 appeared 1864, Feb. 17.

Postal Currency.—The United States government printed a paper money as a substitute for fractional currency during the civil war, owing to the scarcity of silver. This was invented by General Spinner, United States treasurer under Lincoln, and was commonly known as 'shin-plaster' money. The issue was in small scrip of the denominations of 3, 5, 10, 25 and 50 cents. It disappeared from general circulation about 1870.

Greenbacks, Silver and Gold Certificates.—The more recent issues of American paper money in circulation at the present day are printed at the Bureau of Engraving and Printing at Washington. The engravers are specialists, and the figures and intricate designs of their work are often marvels of artistic skill. Portraits of living persons are never put on the notes, and all the figures, vignettes, borders, etc., are engraved separately before they are put on the plates. First the engraver works out his design, and after transferring it by hand to a plate of soft steel the plate is hardened and a soft steel roller takes the impression from it. After this roll is chilled another impression is taken on another steel plate, and after this latter has been hardened it is ready for use. The geometric lathe which makes the border is a complete and wonderful piece of mechanism. The lines for the borders, backs and other conventional designs seen on the notes are made by this machine. The paper for printing the bank-notes is manufactured under the supervision of government officials. It has two perpendicular lines of short, uneven silk threads running through it.

Foreign Paper Money.—The notes of the Bank of England are 5 by 8 inches in dimensions, and are printed in black ink on Irish linen water-lined paper, plain, white, with ragged edges. The notes of the Bank of France are made of white water-lined paper, printed in blue and

black, with numerous mythological and allegorical pictures. South American currency is about the size and appearance of the American. The German notes are printed in green and black. The Chinese paper money is in red, white and yellow, with gilt lettering and various devices. Italian notes are printed on white paper in pink, blue, and carmine, and ornamented with a vignette of King Humbert.

MONGE, *mōngzh*, GASPARD, Comte de Péluse: French mathematician and physicist: 1746, May 10—1818, July 28; b. Beaune, dept. of Côte d'Or; of humble parentage. When only 15 years of age, he went to study natural philosophy at the Oratorian College of Lyon, and afterward obtained admission into the famous artillery school at Mézières, where he invented the method known as 'Descriptive Geometry.' In 1780, he was chosen a member of the French Acad., and was called to Paris as professor of hydrodynamics. During the heat of the revolution, he became minister of marine, but soon took charge of the great manufactories for supplying republican France with arms and gunpowder. After he had founded the Ecole Polytechnique, he was sent by the directory to Italy. Here he formed a close friendship with Bonaparte, whom he followed to Egypt; and undertook the management of the Egyptian Institute. On his return to France, he resumed his functions as professor in the Ecole Polytechnique, and, though his reverence for Napoleon continued unabated, he hotly opposed his aristocratic and dynastic views. The title of Comte de Péluse (Pelusium) was conferred on him by Napoleon. He died at Paris. Monge's principal works are: *Traité Elémentaire de Statique* (7th ed. Paris 1834); *Leçons de Géométrie Descriptive;* and *Application de l'Analyse à la Géométrie des Surfaces du 1 et 2 Dégré.*

MONGER, n. *mŭng'gĕr* [Icel. *mangari*, a dealer—from *manga*, to chaffer, to trade—from *mang*, barter: Dut. *manghelen*, to exchange]: a dealer; a trader—now used only as the second element in a compound, as *fish-monger.*

MONGHYR, *mon-ghēr'*, or MUNGIR, *mŭn-ghēr':* city of India, cap. of a dist. in Bahar, Lower Bengal; picturesquely situated on the right bank of the Ganges, 30 m. w.n.w. of Bhagulpur. It is a large and thriving town, and carries on manufactures of hardware and firearms. It was formerly a fortress of great natural strength, and is a favorite residence of invalided military men and their families. Pop. 36,000.

MONGOLIA, *mŏn-gō'lĭ-a:* country in Asia, a dependency of China proper, extending from the great wall on the n. of China to Siberia, and from Manchuria on the e. to the Altai Mts. and Turkestan on the w.; lat. 37°—54° n., long. 85°—125° e.; about 1,300,000 sq.m.; since 1368 subject to the emperors of China, but originally the fatherland of the Mongols (q.v.), whose chieftain, Gen-

ghis Khan (q.v.), created an empire of unexampled extent (1227), and whose grandson, Kûblai Khan (q.v.), became the founder of a Mongol dynasty of China (1279-1368). One-fifth of the inhabitants are Chinese of China proper, who have pressed into Mongolia from the s. side of the great wall. Mongolia is a vast plain, about 3,000 ft. above sea-level, almost without wood and water, and has as its centre, and a third of its area, the desert of Gobi (q.v.) or Shamo, 'sand-sea.' It is divided into four principal regions: 1. Inner Mongolia, with the great wall on the s., the desert on the n., and on the e. to the Ala-shan (mts.); 2. Outer Mongolia, from the w. end of the desert to the Altai Mts.; 3. A s.w. district w. of the Ala-shan range; and 4. The n.w. region about Uliassutai, a considerable town in a well-cultivated valley. The Altai Mts. send subordinate ranges, the Tangnu-Oola and Ken-teh, eastward through n. Mongolia; and the Ala-shan, In-shan, and Khingan ranges reach across e. Mongolia, running n.e. and n. into Manchuria. The rivers Kerulen, upper Nonina, and Argun, in the n.e. of Mongolia, mark the original camping-ground from which the Mongol tribes spread. The Selenga, Orkhon, and Tola are n.-central streams flowing into Lake Baikal. The Hoang-Ho or Yellow river crosses the s.e. region. In the n.w. region lakes abound, of which Lakes Kossogol, Ubsa, and Ike-aral are of considerable size. The very dry air and extreme elevation of Mongolia give a climate so excessively cold that the mercury often remains frozen for several weeks. The winter lasts nine months, and during the short summer there are sometimes days of stifling heat, though almost never without cool nights. Sudden and great changes are common at all seasons. The soil of Mongolia is mostly poor, and is difficult of cultivation on account of the little rain or snow falling anywhere except near the mountain ranges. In the s. part of Mongolia, where the Chinese have come in largely, and introduced regular cultivation of the ground, to which the nomad Mongols are not addicted, tillage appears to have made possible crops which formerly would not ripen. These Chinese immigrant agriculturists are causing many of the native Mongols to give up the s. part of Mongolia, while many others have changed from a nomad to a settled life. The vast plains and mountain ranges of Mongolia are abundantly supplied with wild animals: the elk, stag, goat, ass, yak, two species of tiger, the brown and the black bear, wolves so fierce that they will attack the shepherd rather than his flock, foxes, hares, and squirrels; pheasants and eagles, the latter so favored that they make their nests in any place without fear, almost as if domesticated. The chief property of the native Mongols is in horses, cattle, sheep, and the double-humped or Bactrian camel, which is both domesticated and wild, and as a domestic animal yields large supplies of milk, butter, and cheese. Chinese and Russian trade, entering

Mongolia through the border-town of Kiakhta, introduces European goods. The religion of Mongolia was changed in the 13th c. from a species of Shamanism to Lamaism akin to that of Thibet; and the country abounds in the lamaseries or monasteries of Lamaism, solidly built with stone and brick, adorned with carvings, sculpture, and paintings, well endowed, and in those of the first rank having in residence a living Buddha who is worshipped as a divine incarnation. Pop. of Mongolia 2,580,000.

MONGOLIAN, n. *mŏn-gō'lĭ-ăn:* native or inhabitant of *Mongolia* (see MONGOLIA; MONGOLS): ADJ. term applied to one of the great divisions of mankind, having the Mongols and Chinese as the type; term applied sometimes to the whole class of Turanian tongues; sometimes specifically to that group spoken by the Kalmucks and other tribes from Thibet to China. MONGOL, or MONGOLE, a. *mŏn'gŏl* [native Tartar name]: of or belonging to Mongolia. MONGOLIDÆ, n. *mŏn-gŏl'ĭ-dē:* name given by Dr. Latham to what Blumenbach, Cuvier, and others had called the Mongolian race.

MONGOLS, *mŏng'gŏlz:* term, with an inconvenient variety of applications, for larger or smaller groups of Asiatic races or tribes. In Blumenbach's fivefold classification of mankind the Mongols were one branch, as in Latham's threefold division the Mongolidæ constituted one. In this sense the Mongols correspond to those races speaking Turanian Languages (q.v.); and see ETHNOLOGY; PHILOLOGY)—almost all the Asiatic peoples not Aryan or Semitic. Thus taken, the name Mongolic may be used for the yellow type of man, as distinguished from the Caucasic or fair type, but should not be understood as implying racial relationship, or direct connection between their languages. They have been thus grouped: 1. Tibeto-Burman; 2. Khasi, and 3. Mon (in Assam and Pegu); 4. Tai (including Siamese, Shans, and Laos); 5. Sinico-Annamitic (Chinese, Tonquinese, etc.); 6. Koreo-Japanese; 7. Ural-Altaic; and 8. Malayan. The seventh group, Ural-Altaic, embraces Mongols in the stricter sense; as well as Tungûs (q.v.) and Manchus (see MANCHURIA), Turkish races (see TURKESTAN; TURKS), Samoyedes (q.v.) and Ugrians, including Finns (q.v.) and Hungarians. The Mongols proper fall into an eastern branch, inhabiting Mongolia (the n. section of the central-Asian plateau, between the Kuen Lun and the Altai (q.v.) system, including the Shamo desert, and divided into e. and w. Mongolia); a western branch, of which the Kalmucks (q.v.) are the principal representative; and the Buriats on the slopes of the Altai, e. and w. of Lake Baikal. The e. Mongols, who occupy the original seat of the race, remain the most characteristic of the race; of whom the Khalkhas, in the n. of Mongolia, are the chief tribe. They are thoroughly nomadic, living in tents of felt, and moving about when the pasture has all been

used. They are frank, hospitable, temperate, and (though their ancestors were long the terror of the world) peaceable, but lazy and dirty. Their wealth is in flocks of sheep, camels, horses, and cattle; and they live mainly on flesh, milk, cheese, and butter. They pay yearly tribute to China, and have Chinese colonists scattered among them. See MONGOLIA.

The face of the typical Mongolian is broad and flat, because the cheek-bones stand out laterally and the nasal bones are depressed. The eyes are oblique and wide apart. The eyebrows are scanty. The iris is dark, the cornea yellow. The complexion is tawny, the stature low. The ears are large, standing out from the head; the lips thick, the forehead low and flat, and the hair lank and thin. Of course, this does not apply to the more civilized nations of Mongolic affinities, such as the Turks and Magyars, especially the latter, who, in physical appearance, differ little from other European nations. The name of Tartar, or rather Tatar, belonged originally to the Mongols proper, but passed later to the Turks and Tungusic peoples.

Early in ancient history we find a Turanian race (Accadians—perhaps Turkish) constituting the more cultured section of the Babylonian state. Another great offshoot from the Mongolic stock founded an empire in China. In early Greek history, the Mongols or Tatars figure as Scythians, and in late Roman history as Huns, carrying terror and desolation over the civilized world. The history of the Mongols begins in the 13th c., when Genghis Khan, originally the chief of a small Mongol horde, gradually united various Mongol and Tatar tribes, and conquered almost the whole of central and eastern Asia. For his conquests, see GENGHIS KHAN. His sons and grandsons were equally successful, and 1240-1 the Mongol empire extended from the seaboard of China to the frontiers of Germany and Poland, including Russia and Hungary, and the whole of Asia, with the exception of Asia Minor, Arabia, India and the Indo-Chinese states, and n. Siberia. The cap. was Karakorum (q.v.). In the bloody battle of Wahlstatt in Silesia (1241), Germans and Poles checked the westward course of the orientals. The Mongols became partly Buddhists, partly Moslems; and the vast empire soon broke up into a number of independent kingdoms (see KUBLAI KHAN; KIPTCHAK). The Mongols were driven out of China 1363, and in the 15th c. their domain in Russia ceased. From Turkestan, however, arose another tide of Mongol and Turkish invasion, under the guidance of Timûr (q.v.) or Tamerlane, who, in the later part of the 14th c., reduced Turkestan, Persia, Hindustan, Asia Minor, and Georgia under his sway, and broke, for a time, the Turkish power. This empire was finally absorbed by the Persians and Usbeks; but an offshoot of Timûr's family founded, in the 16th c., the great Mongol empire of Delhi, hence

called Mogul or Mughal, another way of writing Mongol (see BABER). After the decline of Timûr's empire, the Turks spread terror to the very heart of w. Europe. In the 9th c., the Magyars, a tribe of Ugrians, established themselves in Hungary. See TURKS; OTTOMAN EMPIRE; HUNGARY.

For the various Mongoloid peoples, their character, language, and religions, see the numerous titles referring to them or to the countries where they are found. The most recent ethnological and philological schemes exclude from the Mongolic or Mongoloid group various races or stocks formerly accounted Mongol, or even called Turanian. Thus the Dravidian and Kolarian races of s. India are set down as of doubtful affinity; also the Singhalese, the Khmer in Cambodia, the Ainos in Yesso, the Chukchis, Koriaks, Kamtchadales in Siberia.

The first five groups of the Mongolic races use the languages known as Isolating or Monosyllabic (see PHILOLOGY), though no positive relationship can be proved to exist between the main divisions of these tongues; the remaining groups have the tongues known as agglutinating. The languages of the Ural-Altaic peoples (to which the name of Turanian may with advantage be confined) are now generally held to be fundamentally related, and are typically agglutinative. It seems less clear that the nations who speak them are of one blood, as much intermixture with Caucasic peoples has brought great diversity of type. The Korean and Japanese, also agglutinative, show no affinities to the Ural-Altaic speech.

In religion, a large portion of the Mongoloid peoples are Buddhist (see BUDDHISM—BUDDHA; LAMAISM, under LAMA), though heathenism, Mohammedanism, and Christianity have their followers. The Mongols proper are mainly Buddhist; many are Shamans (see SHAMANISM), and some of the Buriats have conformed to the Greek Church. See Howorth, *History of the Mongols* (1880); Gilmour, *Among the Mongols* (1883).

MON'GOOSE, or MUN'GOUS (quadruped). See ICHNEUMON.

MONGREL, a. *mŭng'grĕl* [It. *mongrellino*, of mixed breed: Dut. *menghen*, to mingle—with the dim. termination *rel*]: of a mixed breed; of different kinds: N. an animal of a mixed breed, particularly a dog.

MON'ICA, SAINT: mother of Saint Augustine (q.v.): b. Africa, 332; d. Ostia, 387. A Christian who, in accordance with the wishes of her parents, also Christians, married a pagan. She devoted nearly all her life to the conversion of her husband and son Augustine. Her self-sacrifice was at last rewarded; her husband, Patricius, became a Christian, and Augustine, seeing the error of his ways, reformed. After the baptism of Saint Augustine at Easter, 387, she set out with her two sons for Africa. Arriving at Ostia she became ill and here died.

A friend asked her in Ostia if she were not afraid to be buried in a place so far from her own country. She replied: 'Nothing is far from God.' Her eminent son preserved many of her holy sayings, which he often repeated in his sermons. In the Roman Catholic Church she is regarded as the model and patroness of wives and mothers. Her feast is May 4. Consult: *Saint Augustine's Works,* edited by Tillemont; Butler, *Lives of the Saints.*

MONIER-WILLIAMS, Sir MONIER: English Sanskrit scholar: b. Bombay, 1819, Nov. 12; d. Cannes, France, 1899, Apr. 11. He was a son of Monier-Williams, surveyor-general. He was educated at Oxford, and was for a short period a student at the East India College, Haileybury. He was professor of Sanskrit at Haileybury from 1844 to the extinction of the college in 1858, and in 1860 became Boden Sanskrit professor at Oxford, a post which he held till his death. Among his numerous works are: *Practical Sanskrit Grammar* (1846); *English-Sanskrit Dictionary* (1851); edition with notes, translations, etc., of the Sakuntalā (1853); *Introduction to Hindustani* (1858); *Indian Epic Poetry* (1863); *Sanskrit-English Dictionary* (1872, 2d edition 1899); *Indian Wisdom* (1875); *Hinduism* (1877); *Modern India and the Indians* (1878); *Religious Life and Thought in India* (1883); *The Holy Bible and the Sacred Books of the East* (1886); *Brahmanism and Hinduism* (1889); *Reminiscences of Old Haileybury College* (1894).

MONILIFORM, a. *mŏn-ĭl'ĭ-fawrm* [L. *monīlĕ,* a necklace; *forma,* shape]: like a necklace; jointed or united so as to resemble a string of beads.

MONIMENT, n. *mŏn'ĭ-mĕnt* [see MONUMENT, of which it is another spelling]: in *OE.,* a memorial; a record; an image.

MONIMIACEÆ, *mŏn-ĭm-ĭ-ā'sē-ē:* a natural order of exogenous plants, consisting of trees and shrubs, with opposite leaves destitute of stipules; the bark and leaves having an aromatic fragrance. There are about 40 known species, natives chiefly of South America. The fruit of the BOLDU (*Boldoa fragrans*), a shrub or small tree, a native of Chili, is eaten.

MONISM, *mŏn'ĭzm* [Gr. *móros,* single]: in philosophy, the view which maintains the ultimate unity of all forms of existence; opposed to PLURALISM or MONADISM, which holds that ultimate reality consists of a plurality of independent entities or monads. Most great philosophers have been monists of one sort or other; e.g., Plato, Aristotle, Spinoza, Fichte, Hegel. Leibnitz and Herbert are usually classed as pluralists, but, in truth, the distinctions between philosophers in this regard depend on where the emphasis falls in their systems. Philosophy is essentially a search for a unified view of things, and it carries farther the belief in the ultimate coherence of things, in a universe or cosmos, which belief is the presupposition of

practical activity and is progressively verified by science. Some philosophers, such as Spinoza, tend to submerge individual beings in the One. Others, such as Leibnitz, emphasize the reality of the individual, while holding to an ultimate unity. The task of metaphysics is to preserve the balance between an abstract monism, which reduces the individual to an illusion, and a pluralism, which reduces the world-order to chaos. A special form of monism is PSYCHO-PHYSICAL MONISM, which asserts the identity of mind and body, in opposition to DUALISM (q.v.), which holds that they are separate interacting entities. See also PARALLELISM (psycho-physical).

MON'ITA SECRE'TA SOCIETA'TIS JES'U: work by an unknown author, purporting to be a collection of secret instructions for the Jesuit order; published first at Cracow 1612, in Latin, from the Spanish; often republished since in various languages. In the 17th c. it was regarded as genuine by Prot. historians generally. The almost universal verdict of recent scholarship is that the work is either a forgery or a satire. See JESUIT.

MONITEUR, LE, *lĕh mo-nī-tėr':* French journal of wide repute, started by the publisher, Charles Joseph Panckoucke, 1789, May 5, under the title *Gazette Nationale, ou le Moniteur Universel.* During the Revolution its importance immensely increased. In 1800, it divided itself into halves, of which the first contained the *Actes du Gouvernment:* this change imparted to the journal something of an official character. After 1811, Jan. 1, it dropped the title *Gazette Nationale,* retaining the title *Moniteur Universel.* After the restoration, it became the government organ, which it continued to be until 1869, when its official connection was discontinued.

MONITION, n. *mō-nĭsh'ŭn* [F. *monition,* admonition—from L. *monitiōnem,* counsel, advice]: instruction given by way of caution; warning: in *English ecclesiastical courts,* the lightest form of church censure, in the form of an order whose disregard entails the penalties of contempt of court. MONITIVE, a. *mŏn'ĭ-tĭv,* warning; admonitory. MONITOR, n. *mŏn'ĭ-tėr* [L.]: one who warns of faults or gives instruction in regard to duty; an older boy in a school who assists the master—the girl who does so is called a MONITRESS, *mŏn'ĭ-trĕs:* one of a family of lizards (see below): an iron steam-vessel of war having its guns in a raised turret (see TURRET-SHIP). MON'ITO'RIAL, a. *-tō'rĭ-ăl* [F.—L.]: of or relating to a monitor; teaching by monitors. MON'ITO'RIALLY, ad. *-lĭ.* MON'ITORSHIP, n. *-tėr-shĭp,* the office of a monitor. MONITORY, a. *mŏn'ĭ-tėr-ĭ,* giving or containing warning or advice.

MONITOR, THE: an ironclad, the first of a class of naval vessels designated as monitors. It was designed and built for the United States government in 1861-2 under the direction of the engineer John Ericsson (q.v.), who adopted as the most essential feature of its con-

struction the revolving gun-turret devised by the American inventor Theodore Ruggles Timby (q.v.). The *Monitor* was launched at Greenpoint, L. I., 1862, Jan. 30, only 100 days after the laying of her keel. She put to sea Mar. 6 following, under command of Lieut. John L. Worden (q.v.), arriving on the night of the 8th at Hampton Roads, Va.

The *Monitor* was built by a company of men, John F. Winslow and John A. Griswold of Troy, N. Y., and their associates, who were actuated by patriotic motives. With T. R. Timby, who had taken out patents 'for revolving towers for offensive or defensive warfare whether placed on land or water,' they entered into a contract for the use of his inventions covering the revolving turret, paying him $5,000 as royalty on each turret constructed by them. They built the *Monitor* at their own risk, Winslow and Griswold furnishing 90 per cent. and C. S. Bushnell of New Haven, Conn., 10 per cent. of the cost. Ericsson, for his services as engineer, received 5 per cent. of the gross sum paid to the company for the *Monitor* and kindred vessels built by them. A contract with the government was made by the company and Ericsson, and the government paid for the *Monitor* $275,000, the actual cost being $195,000.

The contract with the government provided for the building of 'an iron-clad, shot-proof steam battery of iron and wood combined,' and the hull of the *Monitor* was of iron with wooden deck-beams and side-projection. Her dimensions were:

Extreme length	172 ft.
Extreme breadth	41 ft. 6 in.
Depth of hold	11 ft. 4 in.
Draft	10 ft. 6 in.
Inside diameter of turret	20 ft.
Height of turret	9 ft.
Thickness of turret	8 in.
Thickness of side-armor	5 in.
Thickness of deck-plating	1 in.
Diameter of propeller	9 ft.
Diameter of steam cylinders (two)	36 in.
Length of stroke	2 ft. 2 in.
Displacement	1,255 tons.

Armament, two 11-in. shell-guns, each 15,668 pounds.

In all the models, drawings, and plans of his invention made by T. R. Timby himself, the pilot-house or 'look-out' was placed on top of the turret. 'For some inexplicable reason,' he has said, 'the *Monitor* had her pilot-house placed upon the deck, forward of the turret, in the way of her own guns.'

The success of the *Monitor* aroused much interest in all maritime nations, and was the direct cause of many modifications in the construction of vessels in the navies of Europe, though nowhere except in the United States navy was the monitor adopted as a distinct type of warship. During a gale off Cape Hatteras 1862, Dec. 31, the *Monitor* was sunk.

MONITOR.

The contract for the construction of the *Monitor* was entered into by the navy department in the hope that she could be completed before the *Merrimac*, then building by the Confederates at the Norfolk Navy Yard, could be finished, and that the *Monitor* would be able to cope with this formidable ironclad. The *Merrimac*, called by the Confederates the *Virginia*, was being reconstructed upon the hull of the United States frigate *Merrimac*, of 3,200 tons, which had been sunk, when the Norfolk Navy Yard was abandoned by the Union forces, and was subsequently raised by the Confederates. Her armament was two 7-in. rifles, two 6-in. rifles, and six 9-in. smoothbores.

Each side was aware of the effort of the other to be first ready for active service. The Confederates won by a day. At noon, 1862, Mar. 8, the *Merrimac*, attended by two gunboats, *Raleigh* and *Beaufort*, each one gun, was discovered coming out of the Elizabeth river into Hampton Roads (q.v.) and standing toward the Union fleet off Newport News and Fort Monroe, composed of the steam-frigates *Minnesota*, *Roanoke*, and *Congress*, each 50 guns; the sailing-frigate *St. Lawrence*, 12 guns; and the sloop *Cumberland*, 24 guns. Their armament was mainly 8-in. and 9-in. guns, with several 10-in. pivot guns. These vessels had the heaviest batteries which the government had been able to assemble to watch the *Merrimac*. The latter bore down directly upon the *Congress* and *Cumberland*. At less than a quarter of a mile the *Congress* delivered her broadside, her heaviest shot making no impression. The return-fire of shells crashed through her sides with terrible effect. Passing the *Congress* at 300 yards, the *Merrimac* received the fire of the heaviest guns of the *Cumberland* without the slightest harm resulting, and without replying she drove her iron prow through the side of the Union frigate, crushing it, and at the same time pouring in a fire of shells. Leaving the *Cumberland* rapidly sinking, the ironclad steered for the *Congress*, which had been run ashore, and from a point 150 yards astern raked her decks with shells which caused general destruction and set the ship afire. The *Congress* was obliged to surrender. The *Cumberland* fired a broadside as the water reached the gun-deck, and went down with her flag flying. As she sank, the Confederate steamers *Patrick Henry*, 12 guns, and the *Jamestown*, 2, came out of the James river and joined the *Merrimac*. The *Minnesota* had grounded where the *Merrimac* could not approach within a mile, and her firing was so bad that only one shot struck the frigate. The other Confederate vessels were finally driven off after inflicting much damage with their rifled guns. After several hours' ineffectual attempts to reach the *Minnesota*, the *Merrimac* and attending gunboats returned to Norfolk. Several shore-batteries which had attempted to help proved as useless as the batteries of the frigates had been. The *Congress*

continued to burn, and finally blew up. Over half the crew of the *Cumberland* were lost. The crew of the *Congress* were made prisoners, but, with the exception of the officers, were released. The total loss was some 250, the Confederate loss was nominal. The battle of an afternoon had ended the day of wooden navies.

The reports of the destruction by the *Merrimac* caused consternation at Washington, and in the coast cities and, indeed, throughout the North. Secretary Stanton ordered all preparations made for obstructing the channel of the Potomac far below the capital, and warned those in charge of coast-defenses to use every means that could be devised for protection.

Meantime the *Monitor*, in command of Lieut. John L. Worden, had left New York and after a rough voyage, entered Hampton Roads at 9 o'clock the night after the battle. At 2 o'clock on the morning of the 9th she had anchored alongside the *Minnesota*. At 6 o'clock the *Merrimac* appeared bearing down on them, but at first passed by, gained the channel in which the *Minnesota* lay, and then steamed directly toward her. The *Monitor* swept in between the two and steered for the *Merrimac*. At close quarters the latter brought her bow-guns to bear and missed. There was little to fire at except the low turret with a cross-section of 20 ft. The first reply of the *Monitor* was a solid 11-in. shot which shook the *Merrimac* from stem to stern. The answer was a broadside, some of the shot of which struck the turret, either glancing or falling as harmless as the shot of the frigates the day before had proved against the *Merrimac*. Then followed broadside after broadside without producing the slightest effect on this 'cheese-box on a raft,' as spectators described it. At every opportunity of maneuver the *Monitor* closed in and smote with her 11-in. solid shot, bending the heavy armor and straining the timbers of her adversary. Finally the *Merrimac* left the *Monitor* and crowded steam for the *Minnesota*. Upon reaching point-blank range she received a full broadside, and a shot from a 10-in. pivot gun, without suffering the slightest damage. In reply she raked the *Minnesota* with a shell, set her afire, blew up a tug alongside, and but for the *Monitor*, which had followed under full steam, and now swept in between the two, the *Minnesota* would have shared the fate of the *Congress* and *Cumberland*. In changing position to meet the *Monitor* the *Merrimac* grounded, and the *Monitor* continued hammering with 11-in. shot. As soon as the *Merrimac* was floated she started rapidly down the bay, pursued by the *Monitor*. Suddenly she turned and attempted to run the *Monitor* down. The blow she struck with her prow glanced, and the *Monitor* was unharmed. The *Merrimac* then started for the *Minnesota* for the purpose of ramming her; but when within easy range the *Merrimac*, with all the Confederate ships, changed course at noon and headed for

Norfolk. Her officers subsequently gave as a reason that in attempting to ram the *Monitor* her iron prow was broken, and their vessel was leaking. The armor was reported damaged, the stem twisted, the muzzles of two guns shot away, and the steam-pipe and smokestack riddled. The casualties were only 2 killed and 19 wounded. The consternation of the day before at Washington and the North was transferred to Richmond and the South. Preparations were hastily made by the Confederates for blocking the channels in the Elizabeth and Nansemond rivers, and to obstruct the channel of the James.

The *Merrimac* did not again engage the *Monitor*, and after the evacuation of Norfolk, which occurred May 9, she was destroyed by the Confederates.

The *Monitor* had hurried direct from her shipyard to Fort Monroe and fought without a previous trial-trip, and before she had been accepted by the government.

MONITOR, *mŏn'ĭ-tẽr:* name given to many species of saurian reptiles, nearly allied to the true lizards, from which they differ in having no teeth on the palate. Among them are some of large size, the largest of existing saurians except those of the crocodile tribe. The tail of the greater number is laterally compressed, the better to adapt them to aquatic habits. They receive the name monitor from a notion that they give warning by a hissing sound of the approach of a crocodile or alligator. For the same reason, some of the American species receive the French name *Sauvegarde.* Those of the old world form the family of *Monitoridæ,* and those of America the family *Teïidæ* of some naturalists. There are several genera of both.—The monitor or VARAN OF THE NILE (*M. Niloticus*) is of rather slender form, and has a long tail: it is olive gray, mottled with black. It attains a length of 5 or 6 ft. Crocodiles' eggs form part of its food.—The TEGUEXIN (*Teius Teguexin*) of Brazil and Guiana is of similar size: it preys on aquatic animals. Other large species are plentiful in almost all tropical countries. They are powerful animals, have strong teeth, and defend themselves vigorously if attacked. Some comparatively small species, feeding chiefly on insects, are found in dry situations. Some of the large South American species are used for food. A well known kind is the East Indian monitor (*V. salvator*), which is to be met with from Ceylon and Western India to the Philippines, and is equally at home in the water, on land or in trees. Its rapacity is great and varied; and it is connected with many extraordinary rites and superstitions among the natives, some of which are given in Fennent's *Sketches of the Natural History of Ceylon* (1861). Australia has a large species (*V. gouldi*). Most of these greenish-gray lizards inhabit rivers and ponds, and are active and fierce enemies of all lesser aquatic life. They feed upon the eggs and young of crocodiles, turtles and aquatic birds; and on fishes, amphibians, swimming-birds.

MONITO'RIAL SYSTEM, or MUTUAL INSTRUCTION: method of organizing schools and providing the requisite teaching power; applied first by Andrew Bell, D.D. (q.v.), when supt. of the Orphan Hospital, Madras, 1795. He made use of the more advanced boys in the school to instruct the younger pupils: these youthful teachers were called Monitors. The method was eagerly adopted by Joseph Lancaster, who in the first years of the 19th c. did so much for the extension of popular education in England; and from him and the originator, the system was called indifferently the Madras and the Lancastrian, as well as the Monitorial or Mutual System. At a time when the whole question of primary education was in its infancy, the state refusing to promote it on the ground that it was dangerous to society, and the public little disposed to contribute toward its extension, it was of great importance that a system should be adopted which should recommend itself as at once effectual and economical. It was manifest that even with the most skilful arrangement of classes, a single teacher could not undertake the tuition of more than 80 or 90 pupils; while, by the judicious employment of the cleverer boys under the general direction of the master, the school might be made almost self-working, and 300 or 400 children taught where there was only one adult superintendent. The novelty and economy of this plan of using more advanced scholars as helpers to the adult teacher, who could thus extend his number of pupils from 80 or 90 to 300 or 400, commended the system at a time when public primary education was deemed by many an expensive luxury; and the M. S. gained large and enthusiastic support in Britain and in Germany. But the value of the system was much overrated; for though technical and rote subjects may be taught by monitors, yet children so instructed are not in any sense of the word educated. Their monitor necessarily lacks the maturity of mind indispensable to the instructor, whose business it is to arouse the mental activity of the child, and to lead him to an intelligent grasp of intellectual and moral and physical truths. Thus as education took a more scientific development, the M. S. was largely discarded. The reaction against the system, however, was not so violent in Great Britain or in Holland and France, as in Germany. In England, and to a small extent in the United States, the M. S. is in use in a modified form which secures for the master the aid of the more advanced pupils in teaching rote subjects, in revising lessons, keeping registers, and supervising and reporting the work of a limited number of classes. The M. S. in this very restricted application affords means of training for the teaching profession pupils who seem fitted by natural endowment for the work. Hence the prevalent employment in Britain of paid monitors and pupil-teachers (male and female), regularly apprenticed to school-managers and teachers, and in time going onward to be trained in normal schools.

MONK, n. *mŭngk* [Ger. *Mönch;* L. *monăchus;* Gr. *monăchos,* a solitary, a monk—from Gr. *monos,* alone; *ĕchō,* I keep]: one who devotes his life exclusively to religious concerns, and lives under a certain rule or discipline—generally in a community or order in a monastery; a recluse; a solitary one (see MONACHISM: MONASTERY). MONK'ISH, a. *mŭngk'ĭsh,* pertaining to a monk, or like one. MONK'HOOD, n. *-hŭd,* condition or character of a monk. MONKERY, n. *mŭngk'ĕr-ĭ,* monastic life, in reproach. MONK'S-HOOD, a poisonous plant—so named from the cowl-like shape of the flowers; the aconite; the *Aconītum napellus,* ord. *Ranunculāceæ* (see ACONITE). CLOISTER MONK, one who lives in the monastery. EXTRA-MONK, one who lives outside and serves a church connected with the monastery. MONK-FISH (see ANGEL-FISH). MONK'S-RHUBARB, a species of water-dock, the *Rumex alpīnus,* ord. *Polygŏnācĕæ* (see DOCK). *Note.*—As regards persons living secluded from the world in religious houses, the males are called *monks,* and the females *nuns;* the residence of a monk is called a *monastery,* and that of a nun a *nunnery* or *convent.*

MONK, *mŭnk,* GEORGE, Duke of Albemarle: 1608, Dec. 6—1669, Dec. 3; b. Potheridge, near Torrington, Devonshire; second son of Sir Thomas M. of Potheridge. He spent some of his earlier years in the service of Holland, returned to England when about the age of 30, and served in the king's army against the Scots 1639, attaining the rank of lieut.col. On the breaking out of the Irish rebellion, 1642, he was appointed col. of Lord Leicester's troops, sent to crush it. When the civil war began, these troops were recalled, and M. was imprisoned on account of being supposed to favor the cause of the parliament, but was soon released. In 1644, he was defeated and taken prisoner by Fairfax, in command of the parliamentary army, and imprisoned in the Tower, from which he was liberated, after two years, on his swearing the covenant. Clarendon hints that he sold himself for money. He was now intrusted with the command in n. Ireland. Cromwell had a high opinion of his military talents, and made him his lieut.gen. and commandant of artillery; and the service which he rendered at the battle of Dunbar was so great, that he was intrusted with the chief command in Scotland. In 1653, he was joined with Admiral Blake in an expedition against the Dutch, and with his division of the fleet, consisting of 100 ships, defeated Admiral Van Tromp off Nieuwpoort, and fought another and very sanguinary battle with him off Katwijk, in which the victory was doubtful, but Van Tromp lost his life. 1654, April, Cromwell sent him to Scotland as gov., in which difficult office he conducted himself with vigor, moderation, and equity. Even the highlands, those immemorial 'sanctuaries of plunder,' as Guizot calls them, were reduced to order. Finding Cromwell's chief opponents in Scotland to be the Presb. clergy, he reduced their prerogatives, and disallowed their general assemblies, leaving them their local presbyteries. His

principal residence was Dalkeith, where he spent his leisure hours in gardening, of which he was very fond. When, after Cromwell's death, he saw everything in confusion, and felt his own position perilous, he crossed the English border, 1660, Jan. 1, with 6,000 men, united his troops with those which Fairfax had collected for Charles II., and entered London unopposed, though as yet he kept his views and intentions profoundly secret. His powers of dissimulation, self-control, and reticence were immense. Everybody felt that the decision lay with 'Old George,' as his soldiers used to call him; every party courted him; he was even offered the protectorate; but while he offended nobody, he declined to connect himself with any of the sectaries, and with trained evasion withheld a clear expression of his own judgment regarding the restoration, and waited patiently the course of events. His own secret wish (though it did not proceed from any very high-minded motive) was to bring back the Stuarts; and before long, he saw that the nation in general was thoroughly with him, and was indeed looking to him for leadership in the recall. So, 1660, Feb. 21, he called together the remaining members of the parliament which had been violently driven out 12 years before, and Charles II. was presently recalled. The king after his restoration made M. Duke of Albemarle, loaded him with honors, and intrusted him with the highest offices in the state. But he soon retired from political affairs. In 1665, when the plague ravaged London, and every one fled that could, 'Old George,' as gov. of the city, bravely stuck to his post, and did what he could to allay the terror and confusion. Next year, he was employed as second in command of the fleet sent under the Duke of York against the Dutch; and was defeated by Von Ruyter in a sea-fight off Dunkirk, but soon afterward gained a bloody victory over him off North Foreland.—M., as he appears in history, was a man of great abilities, with wonderful patience and self-restraint; yet as a man whose principle in all public action was to wait for the tide, and to be found with it, and as it were leading it, when it rose. His selfishness was never brutal, never reckless; but it was deep and abiding. He gives no sign of any vulgar vaulting ambition, any more than of a glowing patriotism. His rare self-possession seems to have supplied an element serviceable to the state in those times of universal excitement. As a military commander he was admirable; a great general, a strict disciplinarian, yet always careful to attach his soldiers to himself, so that they cordially loved him. Guizot describes him as a 'man capable of great things, though he had no greatness of soul.' See Guizot's *Monk*, *Chute de la Republique*, Skinner's *Life of Monk*, Hallam's *Constitutional History*, and Macaulay's *History of England*.

MONKEY, n. *mŭng'kĭ* [Bret. *mounika*, a female ape: O.It. *monicchio*, a monkey—a dim. of O. It. *mona* or *monna*, a poor or old woman, a dame in ridicule, a monkey: a familiar corruption of It. *madonna*, my lady: Sp. *mono*, a monkey]: the animal that most resembles man, and is placed highest in the systematic scale; one of the quadrumana, especially a long-tailed one; a term of contempt or reproach for a mischievous person; an apparatus for disengaging and for securing in turns the ram of a pile-driving machine. MON'KEYISM, n. *-ĭzm*, the qualities of a monkey. MONKEY-BLOCK, a small single block strapped with a swivel. MONKEY-BREAD, the baobab-tree, the slightly acrid pulp of whose fruit is used as an article of food by the natives of Africa; the fruit of the *Adansōnĭă digĭtātă*, ord. *Sterculĭăcĕœ*. MONKEY-JACKET, a short spencer or thick pea-jacket. MONKEY-POTS, the woody capsules of the *Lecythis ollārĭă*, a large Brazilian tree, ord. *Myrtăcĕœ* (see LECYTHIDACEÆ). MONKEY-RAIL, a second and lighter rail raised about six inches above the quarter-rail of a ship. MONKEY-WRENCH, a wrench or spanner having a movable jaw. *Note.—Baboons* have short tails, *apes* have none.

MONK'EY (*Simia*): Linnæan genus of *Mammalia*, of the Linnæan order *Primates*, and of Cuvier's order *Quadrumana*, now constituting the family *Simiadæ*. The word M. was formerly of almost, if not altogether, the same signification with *Ape;* but the term *ape* is now more generally applied to those *Simiadæ* which have no tail, and no cheek-pouches; the name M. to those which have cheek-pouches and long tails, prehensile or not prehensile; while the name *Baboon* (q.v.) is applied to creatures considerably different from both. The smaller tailless *Simiadæ* are, however, still frequently spoken of as monkeys, and the term is also sometimes used to comprehend all the *Simiadæ*.

Of all animals, the *Simiadæ* show the greatest resemblance to man, both in general form and in anatomical structure. This is particularly the case with some of the larger apes. In none, however, is there a natural adaptation for the erect position so characteristic of man, which is assumed rarely, and in general only by captive individuals, as the result of training and constraint—all of the M. tribe preferring to walk on four feet rather than on two, but all being adapted for living chiefly among branches of trees, or—according to the habits of a comparatively small number of species—among bushy cliffs, where they make use of the four extremities for prehension, as hands. Most of them leap from branch to branch with wonderful agility, and some also swing themselves from a branch by their long prehensile tail, till they can seize hold of another branch. The thumb, in all the four extremities, is opposable to the fingers, which are long and flexible; but there are some monkeys which lack the thumb of the fore-limbs, or have it merely rudimentary, while the hind-limbs are always furnished with perfect hands. In attempting to walk erect, an ape

necessarily treads, not on the soles, but on the sides of its feet, which are turned inward, and the muscles of the legs do not enable it to maintain an erect position long or easily. This difficulty is increased by the way in which the head is affixed to the vertebral column, the *occipital foramen* being further back than in man, so that the weight of the head is thrown forward.—The face of a M. exhibits a grotesque resemblance to that of man; but the lower forehead, the less perfect nose, and the more projecting jaws, give it a brutal character. The dentition of monkeys is so similar to that of man, that the dental formula for very many is the same, though many others have an additional molar on each side of each jaw; but in many, the great size of the canine teeth is a marked brutal characteristic.—The digestive organs are generally very similar to those of man, but in some of the *Simiadæ*, more exclusively confined to vegetable food, there is a remarkable difference in a peculiar and very complicated structure of the stomach.—The food of monkeys consists chiefly of fruits, corn, and other vegetable substances; but most of them also catch and eat insects, and even birds, of the eggs of which they are very fond. In captivity, they learn to eat and drink almost everything that is used by man, and show a great fondness for sweet things, and for alcoholic liquors.—The skin of monkeys is generally covered in all parts with hair, but some have the face partially naked, and many have naked callosities on the buttocks.—Many have capacious cheek-pouches, in which they stow away food which they cannot consume with sufficient expedition. They are mostly gregarious, though there are some exceptions. Many of the species display strong attachment to their mates and to their offspring. One or two young are usually produced at a birth. They display remarkable propensity and talent for imitation; and this, with their extreme agility, their curious prying disposition, and their love of trick or mischief, makes them very amusing, whether in a wild or a captive state. Many of the stories told of monkeys evince much intelligence, though probably none of the species exceed in intelligence the dog or the elephant. Notwithstanding their resemblance to the human form, their imitative propensity, and their intelligence, none of the monkeys show the least capacity for imitating the human voice; and their 'chattering' is very unlike articulate speech.

The species of this family are very numerous, but all are confined to the warm parts of the world; Australia, however, and the South Sea Islands are destitute of them. They are divided into a number of genera, some of which belong exclusively to particular portions of the world. But in this respect, the most remarkable fact is the difference between those of the old world and those of America, the geographical distribution corresponding with the division of the family into two principal groups —the monkeys of the old world (*Catarrhini* of some naturalists), to which alone the name *Simiadæ* is some-

times restricted, having the nostrils separated only by a narrow septum, and the tail wanting, short, or long, but never prehensile; the monkeys of the new world (*Platyrrhini*), the family *Cebidæ* of some naturalists, having the nostrils widely separated, the tail always long, and often prehensile, most of them having also the four additional molar teeth above noticed, which none of the monkeys of the old world possess; but none of them having cheek-pouches, which many of the monkeys of the old world have.

MONMOUTH, *mŏn'mŭth:* maritime county in the w. of England, bounded s. by the estuary of the Severn, w. by Glamorgan; greatest length n. to s. about 35 m.; greatest breadth about 28 m.; about 572 sq.m., or 368,399 acres. The chief rivers are the Usk, the Wye on the e. border, and the Rumney on the w. border—all flowing s. into the estuary of the Severn. The coast-line, 22 m. in length, is indented only at the mouth of the Usk (which is navigable for vessels of the largest size to Newport), and at the mouth of the Wye, which vessels ascend to Chepstow. The surface is elevated in the n. and n.w. (the Sugar-loaf is 1,954 ft. high); but the coast districts, comprising the Wentloog and the Caldecot Levels, are low and rich, and are protected from the wash of the sea by sea-walls and earthworks. In the fertile valleys of the Usk and Wye, wheat is the principal crop; but in the less favored localities, barley and oats chiefly are grown. Coal, limestone, and ironstone abound in the mineral district in the n.w. of Monmouth. This district abounds in collieries and ironworks, and is a network of railways. Monmouth was a Welsh county until the reign of Henry VIII. The scenery is unusually beautiful; and in no part of England are to be found so many remains of feudal castles as in the eastern districts of this county: the chief remains are Raglan, Caldecot, and Chepstow castles; and Llanthony and Tintern abbeys. Roman antiquities are numerous. Pop. (1901) 230,800.

MONMOUTH: city, county-seat of Warren co., Ill.; on the Chicago, Burlington & Quincy and the Iowa Central railroads; about 95 m. n. by w. of Springfield. It is in an agricultural region, and nearby are coal fields and valuable clay deposits. It was settled in 1836, and in 1852 was incorporated. The present charter was granted in 1874. The chief manufactures are pottery, sewer pipe, stoneware, boxes, agricultural implements, stump-pullers, soap, flour and dairy products. The trade is principally in coal, grain, flour, poultry, dairy products, and livestock. Monmouth College, founded in 1856 under the auspices of the United Presbyterian Church, is here, also the Warren County Library. The chief city officers are the mayor, who holds office two years, and the council. The waterworks are owned and operated by the municipality. Pop. (1900) 7,450.

MON'MOUTH: parliamentary and municipal borough and market-town of England, cap. of the county of M.; amid beautiful scenery, at the confluence of the Monnow and the Wye, 21 m. w.s.w. of Gloucester. Its church, dating from the 14th c., is surmounted by a lofty spire. Of its castle, favorite residence of John of Gaunt, and birthplace of Henry V., the ruins only remain. A building, said to be the study of Geoffrey of Monmouth, is all that remains of the Benedictine monastery. Railways connect the town with Newport on the w. and Ross on the e. Pop. (1881) 6,112; (1891) 5,470.

MON'MOUTH, BATTLE OF: contest in the revolution; at Freehold, Monmouth co., N. J., 1778, June 28, between the Americans under Washington and the British under Sir Henry Clinton. The latter having evacuated Philadelphia June 18, were on their way to Sandy Hook, with the Americans in pursuit. Clinton's main army was encamped on the high ground around Monmouth court house, in Freehold, when early on June 28, Gen. Lee attacked them with his advance guard of 4,000, while yet the main army was 3 m. away. Lee was at first successful, but afterward was completely routed, his men retreating in confusion until Gen. Washington met them, fiercely reprimanded Lee, and himself took command until the troops were reformed. Then Lee resumed command and held his position until ordered to retreat, which he did in good order. Meanwhile Washington had brought up the main body and taken an advantageous position on an eminence with a wood behind and a marsh in front of him: from this position he kept up an effective cannonade on the enemy. The latter made desperate efforts to dislodge the Americans; first attacking their left; then turning against their right under Gen. Greene, where, protected by an orchard, Gen. Wayne was keeping up a harassing and destructive fire. In this attempt Col. Monckton was killed while charging at the head of his royal grenadiers. His troops were repulsed with heavy loss, and Wayne held his position. Finally the British fell back to where Lee had met them in the morning. The Americans could not follow up their advantage, because of fatigue and the excessive heat. During the night Clinton made a hasty and silent retreat, and so escaped. The heat was so intense that many died during the day from its effects alone, the American troops especially being weakened by their terrible privations and suffering during the previous winter at Valley Forge. The loss of the Americans was 69 killed and 160 wounded. Of the British there were nearly 300 killed and 100 wounded and prisoners. After the battle Washington had Gen. Lee court-martialed on the ground of cowardice, and suspended from his command for one year.

MON'MOUTH, JAMES, Duke of: reputed natural son of Charles II.: 1649, Apr. 9—1685, July 15; b. Rotterdam. His mother, Lucy Walters, according to Evelyn, a 'browne, beautiful, bolde, but insipid creature,' came to England with her son 1656, during the Commonwealth. She is said to have been treated as though she had been the king's wife, and was committed to the Tower; but was soon allowed to retire to France, where she died. Charles sought out the boy, and committed him to the care of Lord Crofts, who gave him his own name. On the restoration, M., then 'Mr. James Crofts,' went to England with the queen-dowager, and was handsomely lodged at Hampton Court and Whitehall. These honors were, in after years, referred to by his followers as justifying their belief that he was indeed the king's legitimate son; though doubt has been cast on the statement that M. was even the king's natural son, in view of the fact that Lucy Walters had previously lived with Robert Sidney. The king however always claimed him and seemed fond of him. A wealthy heiress, Anne, daughter of the Earl of Buccleuch, was selected for his wife; and before he had completed his sixteenth year, he was married to her, and was created Duke of Monmouth. About the year 1670, Shaftesbury put M. forward as the head of the popular party, and rival of the Duke of York (afterward James II.). At the period of the Titus Oates' plot (1678), rumors that the 'Protestant Duke' was indeed the king's legitimate son spread far and wide. The Duke of York was compelled to quit the kingdom; and parliament brought forward a bill for excluding him from the succession, when Charles suddenly dissolved it. A document was at the same time issued by the king, solemnly declaring that he had never been married to Lucy Walters. M. was sent into Scotland, 1679, to quell the rebellion. He defeated the Covenanters at Bothwell Bridge; but his humanity to the fleeing and wounded was so conspicuous, and his recommendations to pardon the prisoners were so urgent, as to bring on him the violent censures of the king and Lauderdale. He thus became the favorite of the English nonconformists; though, according to Pepys, he had, years before, established a character for youthful vice and profligacy. He had indeed become noted for beauty of person and emptiness of mind. The return of the Duke of York, and the exile of M., soon followed. In Holland, he allied himself to the leaders of the nonconformist party, exiled like himself; and when he was allowed to return to London, he was received with such demonstrations of joy, that M. felt that he was the people's choice. In truth there was such widespread terror as to the accession to the throne of the king's Rom. Cath. brother, that M.'s possible claim was eagerly seized upon, and was even urged by Shaftesbury. In 1680, he made a semi-royal progress through the west of England, with the design, probably, of courting the nonconformists, who were more numerous there than in any other part of the country, except London and

Essex. In 1682, he traversed some of the n. counties. The king and his brother were alarmed; and M. was arrested at Stafford, and bound over to keep the peace. He meanly confessed his participation in the Rye-House plot, accusing himself and others of a design to seize the king's person, and subvert his government. The king pardoned him on his solemn promise to be a loyal subject to the Duke of York, in case the latter should survive the king. In 1684, M. fled to Antwerp, and remained abroad until the death of the king, when he resolved to embark for England. He landed 1685, June 11, at Lyme-Regis, and issued a manifesto declaring James to be a murderer and usurper, charging him with introducing popery and arbitrary power, and asserting his own legitimacy and right by blood to be king of England. He was received with great acclamations at Taunton, where he was proclaimed as James II. At Frome, he heard the news of the defeat of Argyle, who, at the head of the Scottish exiles, had attempted to raise an insurrection in Scotland. Money and men were now abundant; but arms were wanting, and thousands of those who had flocked to him went home for lack of them. July 5, he was persuaded, with only 2,500 foot and 600 horse, to attack the king's forces, which, under the command of the Earl of Faversham, were encamped at Sedgemoor, near Bridgewater. M.'s troops were unable to cross a running stream or wide ditch which protected the camp, and were mowed down by the king's artillery. Their ammunition soon failed; and M. having set a cowardly example of flight, his troops were slaughtered like sheep. About 300 of M.'s followers fell in the battle; but 1,000 were massacred in the pursuit. M. was found concealed in a ditch, and was brought to London. He made the most humiliating submissions, and obtained a personal interview with James. 'He clung,' says Macaulay, 'in agonies of supplications round the knees of the stern uncle he had wronged, and tasted a bitterness worse than that of death, the bitterness of knowing that he had humbled himself in vain.' Even his prayer for 'one day more,' that he might 'go out of the world as a Christian ought,' was brutally refused. June 15, he was brought to the scaffold, and beheaded on Tower Hill; the executioner performing his office so unskilfully that five blows were struck before the head was severed. M. met his death with calmness. The 'Bloody Assize' afterward commenced under Judge Jeffreys, when M.'s adherents paid a fearful penalty for their participation in his rash and ill-advised rebellion.

MONO-, *mŏn′ō-:* a prefix: see MON.

MONO, n. *mō′nō* [native name in Guatemala]: *Mycetes villosus*, the black howler, a black monkey with a voice which may be heard two miles off. The Indians eat its flesh. It is found in forests from East Guatemala to Paraguay.

MONOBASIC, a. *mŏn′ō-bā′zĭk* [Gr. *monos*, alone; *basis*, a base]: in *chem.*, requiring only one molecule of base to one of the acid to form a neutral salt, thus nitric acid is monobasic; in *bot.*, applied to a root reduced to a small unbranched portion, as though it formed merely the base of the stem.

MONOCARDIAN, a. *mŏn′ō-kär′dĭ-ăn* [Gr. *monos*, alone; *kardiă*, the heart]: having a single heart, that is, one consisting of a single auricle and ventricle, as fishes: N. an animal having a single heart.

MONOCARPON, n. *mŏn′ō-kär′pŏn* [Gr. *monos*, alone; *karpos*, fruit]: in *bot.*, a plant bearing fruit but once and then perishing; an annual plant. MON′OCAR′POUS, a. *-kär′pŭs*, or MON′OCAR′PIC, a. *-kär′pĭk*, bearing fruit but once and then perishing, as wheat, oats, etc. MON′OCAR′PLÆ, n. plu. *-pĭ-ē*, plants which bear fruit once and then perish.

MONOCEPHALOUS, a. *mŏn-ō-sĕf′a-lŭs* [Gr. *monokephalos*]: in *science*, having one head, but two distinct, or sometimes blended, bodies: in *bot.*, having a single head of flowers.

MONOCEROUS, a. *mŏ-nŏs′ėr-ŭs* [Gr. *monos*, alone; *keras*, a horn, a tusk]: having only one horn or tusk.

MONOCHLAMYDEOUS, a. *mŏn′ō-klăm-ĭd′ē-ŭs* [Gr. *monos*, alone; *chlamus* or *chlam′uda*, a military cloak, a scarf]: in *bot.*, having a single floral envelope or covering, which is the calyx.

MONOCHORD, n. *mŏn′ō-kawrd* [Gr. *monos*, alone; *chordē*, a gut or string]: musical instrument constructed to exhibit the mathematical proportions of musical intervals. It consists of a flat board four or eight ft. long, better 16 ft. where space can be spared. The breadth of the board is according to the number of the strings, from two to six. The board is covered with fine white paper. A straight line is drawn from end to end below each string, and each line is accurately divided into the different proportions into which the full length of the string, as a fundamental sound, harmonically divides itself: see HARMONICS. The string is fixed at one end, and rests on a bridge; while at the other end, where it also rests on a bridge, it is stretched by a tuning-peg, or by a weight. The sounds from the strings are produced by a violin-bow. The M. is used chiefly in illustrating acoustical experiments in the proportion of intervals and temperament.

MONOCHROME, n. *mŏn′ō-krōm* [Gr. *monos*, alone; *chroma*, color, complexion]: a painting in its tints, tones, and shades of only one color. MON′OCHROMAT′IC, a. *-măt′ĭk*, consisting of one color; exhibiting light only of one color.

MONOCLE, n. *mŏn′ō-kl* [F. single eye-glass; OF. *monocle*; L. *monoculus*, one-eyed]: animal with one eye; eye-glass for one eye.

MONOCLINATE, a. *mŏ-nŏk′lĭ-nāt* [Gr. *monos*, alone; *klinō*, I bend]: having one of the axes obliquely inclined; in *min.*, applied to certain crystals. MONOCLINOUS, a. *mŏ-nŏk′lĭ-nŭs*, in *bot.*, having both stamens and pistils in every flower. MONOCLINAL, a. *mŏn′ō-klī′năl*, in *geol.*, applied to strata that dip for an unknown length in one direction. MONOCLINIC, a. *mŏn′ō-klĭn′ĭk*, applied to a system of crystallization in which the crystals have three unequal axes, two of which intersect each other at an oblique angle, and are cut by the third at right angles; also called MONOCLINOHEDRIC, a. *mŏn′ō-klĭn-ō-hĕd′rĭk* [Gr. *hedra*, a seat].

MONOCOTYLEDON, n. *mŏn′ō-kŏt′ĭ-lē′dŏn* [Gr. *monos*, alone; *kotulēdon*, the hollow of a cup, cup-shaped]: a plant with only one cotyledon or seed-lobe, as in oats or wheat. MON′OCOT′YLE′DONOUS, a. *-lē′dŏ-nŭs*, having only one cotyledon or seed-lobe.

MONOCOTYLE′DONOUS PLANTS: plants in which the embryo has one and only one Cotyledon (q.v.). The cotyledon in these plants varies extremely in form, and is often comparatively of great size, but has always a slit, from which, as germination takes place, the gemmule sprouts. The gemmule in elongating assumes an acuminated shape. M. P. all are Endogenous (q.v.); except the Dictyogens (q.v.), in which the endogenous structure is not perfectly exhibited. They are also *endorhizal* [Gr. *endon*, within; *rhiza*, a root]; that is, the radicle is covered with a cellular sheath, and gives rise to fibrils similar to itself in structure. The leaves are generally sheathing at the base, and there embrace the stem; they also generally have simple parallel nerves connected by cross veins, the leaves of dictyogens alone being reticulated. The number of the parts of the flower is generally three, or a multiple of three. The floral envelopes, often splendid, as in lilies, tulips, etc.—are generally united as a Perianth (q.v.), instead of forming a distinct calyx and corolla. The principal natural orders of M. P. are Grasses, *Cyperaceæ*, Palms, Orchids, *Scitamineæ*, *Musaceæ*, *Liliaceæ*, and *Iridaceæ*. The general appearance of these plants distinguishes them almost as perfectly as any structural characters.

Of the fossil remains of the vegetable kingdom, the smallest portion consists of M. P., both acotyledonous and dicotyledonous plants being much more abundant.

MONOCRACY, n. *mŏn-ŏk′ră-sĭ* [Gr. *monos*, alone; *kratĕō*, I govern]: government by a single person. MON′-OCRAT, n. *-krăt*, one who rules alone.

MONOCULAR, a. *mŏn-ŏk′ū-lĕr*, or MONOC′ULOUS, a. *-lŭs* [Gr. *monos*, alone; L. *oc′ŭlus*, the eye]: one-eyed; suited for one eye, as an ordinary microscope. MON-OCULE, n. *mŏn′ō-kūl*, a one-eyed insect.

MONOCYSTIC, a. *mŏn′ō-sĭs′tĭk* [Gr. *monos*, one; *kustis*, a bag, a bladder]: consisting of only one cell or cavity; unilocular.

MONOD, *mo-nod′*, ADOLPHE FRÉDÉRIC THEODORE: French Prot. clergyman: 1802, Jan. 21—1856, April 6; b. Copenhagen, whither his father, Jean M., pastor of the Reformed Church in Paris, had removed at the outbreak of the French Revolution. He was the second son (bro. of Frédéric M.) of an eminent family; was educated at the Coll. Bonaparte, Paris; studied theology at Geneva (to 1824); visited Italy and preached 1825–27 to a small Prot. congregation at Naples; returning to France was appointed pastor of the Reformed Church in Lyons, and made so strong an impression that, though himself removed on account of objection to his evangelical fervor and orthodox views of the person and mission of Christ, the church soon grew out of its small private meeting-place into a spacious chapel; and 30 years later, where he had begun alone, there were four evangelical pastors, many evangelists, and eight chapels. In 1838 he was appointed by the govt. prof. of theology at Montauban, and filled the office 11 years, travelling meanwhile in s. France, preaching and giving Bible instruction of great interest and power. In 1849 he succeeded his elder brother at the Oratoire in Paris, by appointment of the consistory and govt. confirmation. His eloquence, spiritual power, sympathetic and cultivated mind, refined character, and gift of imagination gave him remarkable success, both in the pulpit and in Bible instruction. He died suddenly, in Paris. Besides a volume of sermons, 1844, he published *Lucile, ou la Lecture de la Bible; La Femme;* and *Saint Paul.*

MONOD′, FRÉDÉRIC JOEL JEAN GERARD: French Prot. clergyman: 1794, May 17—1863; b. Monnaz near Morges, Switzerland, eldest son of Jean M., and brother of Adolphe M. He was educated at Geneva, entered the ministry 1820, was pastor of the Oratoire in Paris more than 12 years, after his father's death; established 1824, and edited until his death, the *Archives du Christianisme;* united with Count de Gasparin, Edouard de Pressensé, and others in seeking to restore in the national (Prot.) church a rule of faith making rationalism inconsistent with membership; and not succeeding, took a leading part in organizing a Free Church of France based on belief in the divine mission and person of Christ. As preacher, lecturer, and Free Church leader his influence and reputation were very great. He visited America 1858, and was cordially received. His admiration of American institutions was extreme, and during the civil war he was one of the originators of an address signed by the majority of French ministers, earnestly deprecating the overthrow of the Union.—A son, Jean, became theol. prof. at Montauban 1865.

MONODACTYLOUS, n. *mŏn′ō-dăk′tĭl-ŭs* [Gr. *monos*, alone; *dak′tulos*, a finger or toe]: having only one finger or toe.

MONODELPHIA, n. plu. *mŏn′ō-dĕl′fĭ-ă* [Gr. *monos*, alone, single; *delphus*, a womb]: the division of mammals which have the uterus single, including all except the monotremes and marsupials. MONODELPHOUS, a. *mŏn′ō-dĕl′fŭs*, resembling the Monodelphia, as in bringing forth the young completely formed; in *bot.*, having all the filaments united so as to form a single bundle around the style.

MONODICHLAMYDEOUS, a. *mŏn-ŏd′ĭ-klăm-ĭd′ē-ŭs* [Gr. *monos*, one; *dis*, twice; *chlamus*, a cloak or tunic]: in *bot.*, having either one or both floral envelopes.

MONODON, n. *mŏn′ō-dŏn* [Gr. *monos*, alone; *odous* or *odonta*, a tooth]: the narwhal or sea-unicorn: see NARWHAL.

MONODY, n. *mŏn′ō-dĭ* [Gr. *monos*, alone; *ōdē*, a song]: a poem or song chanted or sung by a single person, and in which he is supposed to bewail himself; a lament; a dirge. MONODICAL, a. *mō-nŏd′ĭ-kăl*, pertaining to a monody. MON′ODIST, n. *-dĭst*, a writer of monodies.

MONŒCIA, n. *mŏn-ē′shĭ-ă* [Gr. *monos*, one; *oikos*, a house]: a class of plants having the stamens and pistils in distinct flowers on the same plant. MONŒ′CIAN, a. *-shĭ-ăn*. MONŒCIOUS, a. *-shĭ-ŭs*, in *bot.*, having the male and female parts of fructification (*stamens* and *pistils*) in different flowers, but upon the same plant. Such plants and their flowers are said to be *monœcious*. Monœcious plants form one of the Linnæan artificial system, but many occasional instances of monœcious species are found in genera belonging to other classes. Monœcious plants often have the flowers in catkins, sometimes the male flowers only; and often in spikes, the male flowers sometimes occupying the upper, sometimes the under part of the same spike with the female flowers, and sometimes distinct spikes upon the same plant. Common examples of monœcious plants are the hop, box, birch, beech, alder, oak, and hazel. MONŒCISM, n. *mŏ-nē′sĭzm*, the condition where unisexual flowers are produced on different branches.

MONOGAMIA, n. plu. *mŏn′ō-gā′mĭ-ă* [Gr. *monos*, one, single; *gamos*, marriage]: a general name for plants which have their anthers united but their flowers not compound. MONOGAM, n. *mŏn′ō-găm*, a plant having a simple flower though the anthers are united.

MONOGAMY, n. *mŏn-ŏg′ă-mĭ* [Gr. *monogamĭă*—from *monos*, alone; *gamos*, marriage, wedlock]: the marriage of one wife only; the condition or restraint of not marrying a second wife after the death of the first; the opposite of *polygamy*. MONOG′AMIST, n. *-ă-mĭst*, one who disallows second marriages. MONOG′AMOUS, a. *-ă-mŭs*, having one wife only, and not permitted to marry a second wife after the death of the first; as applied to animals, abiding by one female, as the dove.

MONOGASTRIC, a. *mŏn′ō-găs′trĭk* [Gr. *monos*, one; *gastēr*, the belly]; having only one stomach.

MONOGENESIS, n. *mŏn-ō-jĕn′ĕ-sĭs* [Gr. *monos*, alone, single; *genesis*, origin]: term used by Van Beneden to denote direct development of an embryo from a parent similar to itself. Prof. A. Thomson applies the term to the descent of an individual from one parent form, containing both the sperm cell and germ cell; monogony. Haeckel also uses it in this sense. MONOGENISM, n. *mo-nŏj′ĕn-ĭzm* [F. *monogénisme*]: system which assumes that all men are descended from a single pair. MONOG′ENIST, n. *-ĭst* [F. *monogéniste*]: supporter of monogenism. Huxley divides them into three classes: (1) 'Adamites' who accept the Mosaic account of the creation literally; (2) those who occupy a middle position between the 'Adamites' and the 'Rational Monogenists'; (3) 'Rational Monogenists,' including Linnæus, Buffon, Blumenbach, Cuvier, and Pritchard. Their views are that the present condition of the earth has existed for untold ages; that at an extremely remote period man was created somewhere between the Caucasus and the Hindu Koosh; that as men multiplied they migrated; and that climatic influences and other conditions are sufficient to account for all the diversities of mankind. MONOG′ENY, n. *-ĭ*, tenet that mankind sprang from a single pair. See ETHNOLOGY.

MONOGRAM, n. *mŏn′ō-grăm* [Gr. *monos*, alone; *gramma*, a letter]: a cipher, or a single device, formed by the intertexture of two or more letters; the private mark of an artist. MON′OGRAM′MAL, a. *-măl*, or MON′OGRAM′MIC, a. *-mĭk*, resembling or pertaining to a monogram.

MON′OGRAM: a character or single device composed of two or more letters of the alphabet, often interlaced with other lines, and used as a cipher or abbreviation of a name. A perfect M. is one in which all the letters of the word are to be traced. The use of monograms began at a very early date. They are found on Greek coins, medals, and seals, and are particularly numerous on the coins of Macedonia and Sicily. Both on coins and in MSS., it was the practice to represent the names of states and cities by monograms, of which more than 500 are known, but some have not been deciphered. Monograms occur on the family coins of Rome, but not on the coins of the earlier Roman emperors. Constantine placed on his coins one of the earliest of Christian monograms, which is to be traced in the recesses of the catacombs, composed of the first and second letters of the Greek ΧΡιστος (Christus), a M. which also appeared on the Labarum (q.v.), and was continued on the coins of the succeeding emperors of the East to Alexander Comnenus and Theodorus Lascaris. We often find it combined with the first and last letters of the Greek alphabet (Rev. i. 8), as in Fig. 1. Another well-known M. is that of the name of Jesus, IHS, from the first three letters of the Greek ΙΗΣοῦς (Iesous).

Popes, emperors, and kings of France during the middle ages were in the practice of using a M. instead of

signing their names. Almost all the coins of the French kings of the Carlovingian race bear their respective monograms, as also do those of Alfred and some other Saxon

Fig. 1.

kings of England. Fig. 2. represents that of Charlemagne, a perfect M., in which all the letters of *Karolus* can be traced.

Painters and engravers in Germany and Italy have used monograms to a large extent as a means of distinguishing their works. In these, the initial letters of their names were often interwoven with figures of a symbolical character, to form a rebus on the artist's name. Fig. 3 is the M. of Albert Dürer; Fig. 4, of Ludger zum Ring. The first typographers distinguished their publications by wood-cut vignettes, whose invention is ascribed to the elder Aldus; but besides these, each made use of a M. or cipher, a series of which, well known to the bibliographer, fixes the identity of the ancient editions, German, Italian, and English, from the inven-

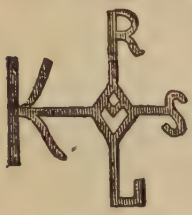


Fig. 2.

Fig. 3. Fig. 4. Fig. 5. Fig. 6.

tion of printing till the middle or end of the 16th c. Fig. 5 is the M. of Andrea Turresano d'Asola, father-in-law of Aldus Manutius; Fig. 6, of Luca Antonio Giunta, famous printer of Venice between 1489 and 1500; Fig. 7, of William Caxton. For a detailed account of the monograms of early printers and others, see Brulliot, *Dictionnaire des Monogrammes* (Munich 1832–34); Horne's *Introduction to Bibliography*, II.; and Herbert and Ames's *Typographical Antiquities*.

Fig. 7.

MONOGRAPH, n. *mŏn'ō-grăf* [Gr. *monos*, alone; *graphō*, I write]: treatise or description limited to a single thing or object, or to a single branch of a subject. MONOGRAPHER, n. *mŏn-ŏg'rā-fĕr*, or MONOG'RAPHIST, n. *-fĭst*, a writer of monographs. MON'OGRAPH'IC, a. *-grăf'ĭk*, or MON'OGRAPH'ICAL, a. *-grăf'ĭ-kăl*, of or pertaining to a monograph. MON'OGRAPH'ICALLY, ad. *-lĭ*. MONOGRAPHY, n. *mŏn-ŏg'rā-fĭ*, the art or practice of writing monographs; description or representation simply by lines without colors.

MONOGYNIA, n. *mŏn'ō-jĭn'ĭ-ă* [Gr. *monos*, alone; *gŭnē*, a female, a woman]: an order of plants, including such as have only one pistil or stigma in a flower. MONOGYN, n. *mŏn'ō-jĭn*, a plant having only one pistil. MON'OGYN'IAN, a. *-jĭn'ĭ-ăn*, or MONOGYNOUS, a. *mŏn-ŏj'ĭ-nŭs*, having only one pistil or stigma in a flower; also applied to plants having one style. MONOGYNŒCIAL, a. *mŏn'ō-jĭn-ē'shĭ-ăl* [Gr. *oikĭă*, a house]: in *bot.*, applied to simple fruits formed by the pistil of one flower.

MONOHEMEROUS, a. *mŏn-ō-hĕm'ĕr-ŭs* [Gr. *monos*, alone, single; *hēmera*, a day]: in *med.*, existing or continuing for a single day.

MONOIDEISM, *mō'nō-ĭd'ē-ĭsm* [Gr. *monos*, alone, and *idea*, idea]: a term applied to a mental state in which the mind is firmly occupied by one idea. Every state of attention is in a measure such a condition, but in abnormal states the concentration which ordinarily is transitory becomes relatively permanent, leading to a form of 'fixed idea.'

MONOLITH, n. *mŏn'ō-lĭth* [Gr. *monos*, alone; *lithos*, a stone]: pillar, column, monument, obelisk, statue, or other structure, consisting of a single stone. MON'OLITH'IC, a. *-lĭth'ĭk*, or MON'OLITH'AL, a. *-ăl*, consisting of a single stone.

MONOLOGUE, n. *mŏn'ō-lŏg* [F. *monologue*, one that loves to hear himself talk—from Gr. *monologos*, speaking alone—from *monos*, alone; *logos*, speech]: a speech or poem uttered by a person alone; a soliloquy. MONOLOGIST, n. *mŏn-ŏl'ō-jĭst*, a writer or performer of monologues. MONOL'OGY, n. *-jĭ*, the habit of soliloquizing, or of monopolizing conversation.

MONOMANIA, n. *mŏn'ō-mā'nĭ-ă* [Gr. *monos*, alone; *manĭă*, madness]: a mental disease in which madness exists on one particular subject, or a limited number of subjects, while the mind is measurably lucid on others. MON'OMA'NIAC, n. *-nĭ-ăk*, one affected with monomania: ADJ. affected with monomania. MON'OMANI'ACAL, a. *-mā-nī'ă-kăl*, having the character of monomania, or affected with it.—SYN. of 'monomania': madness; mania; insanity; derangement; alienation; aberration.

MONOMANIA: partial insanity, in distinction from more general mental disturbances, such as imbecility,

dementia, mania. A single group of ideas or a single function of the mind becomes abnormal, while the rest of the mind, at least in the early stages of the disturbance, is very little affected. The term was introduced by Esquirol; but is now not regarded as describing a particular disease. It is rather a condition of partial abnormality which may occur in several different diseases, in paranoia, in maniacal-depressive insanity, in constitutional neurasthenia, etc. In paranoia the systematized delusions continue to be the most prominent symptoms throughout the course of the disease. They may take the form of some delusion of persecution or of grandeur. The patient may continue to conduct his business for some years with comparatively little disturbance outside his particular delusion. Historically, monomanias have sometimes been distinguished on the basis of their social effects, as kleptomania, a mania to steal; pyromania, a mania to burn; dipsomania, a mania to drink; etc.

MONOME, n. *mŏn'ŏm,* or MONOMIAL, n. *mŏn-ō'mĭ-ăl* [Gr. *monos,* alone; *onoma,* a name]: in *alg.,* a quantity or expression of one term only, as *2ab.*

MONOMETALLISM, a. *mŏn-ō-mĕt'al-ĭzm* [prefix *mono-;* Eng. *metal; -ism*]: the fact or principle of having only one metal (e.g., gold) as a standard for coinage; belief in the advantages of a single metallic standard. See BIMETALLISM; MONEY; etc. MONOMETAL'LIST, n. *-ĭst,* one who advocates monometallism.

MONOMETER, n. *mŏn-ŏm'ĕ-tĕr* [Gr. *monos,* alone; *metron,* a measure]: a rhythmical series consisting of a single metre. MON'OMET'RIC, a. *-rĭk,* having the axes equal or similar, said of certain systems of crystallization.

MONOMORPHOUS, a. *mŏn'ō-mŏr-fŭs* [Gr. *monos,* alone; *morphē,* form]: having but a single form—said of insects which, in their larval state, are nearly the same as in the perfect condition, except as regards wings.

MONOMYARIA, n. plu. *mŏn'ō-mī-ā'rĭ-ă,* or MON'OMY'ARIES, n. plu. *-mī'ă-rĭz* [Gr. *monos,* single; *mus,* a muscle]: a term employed to distinguish those bivalves whose shells are closed by a single adductor muscle, such as the oysters and clam-shells. MON'OMY'ARY, n. *-mī'ă-rĭ,* a bivalve of the order *Monomyaria:* ADJ. having but one muscle for closing the shell.

MONONGAHELA, *mō-nŏn-ga-hē'la,* RIVER: stream rising in the Alleghany Mountains in Virginia, flowing n. into Pennsylvania, and uniting with the Alleghany at Pittsburg to form the Ohio; length 300 m.

MONONGAHELA, BATTLE OF THE: the name given to one of the battles of the war between France and England (known as the French and Indian war) for the possession of the territory adjacent to the Great Lakes and the Ohio river basin. Gen. Edward Braddock (q.v.) on Sep. 24, 1754, had been appointed commander of the

English forces in America and determined to reduce Fort Duquesne (Pittsburg), that being an important French post. He was short of money, supplies and regular troops and the colonists were slow to aid him in collecting them. He tried to secure a large body of Indians for scouts and allies, but only obtained 40 or 50. He let all but eight of them go through bad judgment, and disgusted those so greatly by his manners that one of them deserted, and the rest warned their friends against coming near. Transportation facilities were also meagre and the route tedious and difficult, but finally the expedition started from Fort Cumberland (now Cumberland, Md.) the first week in June, 1755, with 2,150 men. The march was most toilsome and slow, involving cutting roads, bridging streams, making causeways, passing through swamps, etc.; and on the 18th, at Little Meadows, 1,200 picked men were chosen to continue the expedition, the rest being left behind under Dunbar. On the night of July 4 he halted two days about 25 m. from his destination, to wait the reports of his Indian scouts and convoy of provisions from Dunbar's camp—to his destruction but not to his blame. Reaching Turtle (now Rush) creek the road suddenly ended at a precipice impassable for artillery and wagons, and he decided to quit the ridge, where ambuscade was impossible, and make a double fording across an elbow of the Monongahela. Meantime the French commander, Contrecœur, had decided to withdraw without a blow, but a Captain Beaujeu asked leave to take a detachment and resist the passage of the second ford, 8 m. off. He was given about 200 white troops, and by a brilliant appeal on the morning of the 9th to the Indians, who at first hung back, obtained several hundred of them also. When he came in sight of the English, they had already crossed, and advanced so that both flanks would be exposed for some 200 yards to an enemy who occupied the deep ravines, thick with tangled forest growth and vines, that seamed the river bluff. Braddock's ruinous error was in not beating up ahead on his flanks, as Col. Sir Peter Halket urgently besought him to do the night before; thereby he marched straight into the worst of ambushes. Into these the Indians glided, while the white troops barred the English path in front; and the head of the advancing column went down under a storm of lead. Shaken for a moment, the vanguard moved against the concentric ring; and after another terrible discharge, returned it with a volley that swept away every enemy in sight, and struck Beaujeu and a dozen others dead. The Indians turned to fly; rallied by the other French officers, they returned to cover, and under their unerring fire the English advance broke and retreated; mixing with the rear in the narrow path, both became mingled in a mob which Braddock could not restore to order. Huddled into a 12-foot road, shut in by a forest alive with yells and filled with an invisible foe, they lost all sense or percep-

tion, and twice shot down bodies of their own men who had gained slight vantage points, taking their smoke for the enemy's. Fifty Virginians were thus slain at a blow. The regulars refused to charge, though Braddock, with four horses successively shot under him, and the other officers strove to hearten them to invade the wood: the provincials sought to fight Indian fashion behind trees and logs, but Braddock with furious threats and blows drove them back into rank again, where they fell in scores. Washington and Halket begged to have them allowed to leave the ranks, but Braddock still refused. The ammunition began to fail; the baggage was attacked; all Braddock's aides but Washington were shot down; three-fourths of the officers, and three-fifths of the entire army; and only then would the ill-judging but heroic Braddock give the signal for retreat. Shortly afterward Braddock received a ball through the lungs; not one of the English soldiery would stay to carry him off the field, but one English and two American officers took him from the field to a spot half a mile across the river. Here the dying hero tried to establish a camp for a rallying place, and to care for the wounded and wait for Washington's return from Dunbar; but although the French and Indians had not followed them across, the 100 English soldiers he had induced to stop there stole away again and fled. The officers with their commander marched on till 10 P.M. on the 10th, when they halted and met the convoy from Dunbar; on the 11th he reached Dunbar's camp, where the news of the rout had set his soldiers also deserting and fleeing in wild panic. Giving up all hope of the expedition in any hands now, the remnant of the army proceeded toward Great Meadows, where Braddock expired, leaving his favorite horse and body servant to Washington. Of 1,460 men in the battle, 456 were killed and 421 wounded; 63 out of 89 commissioned officers were killed or injured, and every field officer. The enemy's casualties were about 60.

MONONGAHELA CITY: city in Washington co., Pa.; on the Monongahela river, and on the Pennsylvania and the Pittsburg & Lake Erie railroads; about 32 m. s. of Pittsburg. It is in a coal region, in which the chief industries are coal mining and manufacturing. It was settled in 1792 by Joseph Parkison, was incorporated as a borough 1833, Apr. 3, and chartered as a city 1873, Mar. 24. The chief manufactures are glass, foundry and machine-shop products, flour, lumber and paper. It has considerable trade in the home manufactures, and in coal and farm products. The principal buildings are 11 churches, 5 public schools, an academy, and a Memorial Hospital. The 4 banks contain a combined capital of $2,500,000. The government is administered by a mayor and a council of 12 members, all of whom are elected annually. Pop. (1900) 5,173.

MONOPATHY, n. *mŏn-ŏp'ă-thĭ* [Gr. *monos,* alone; *pathos,* suffering]: solitary suffering or sensibility.

MONOPETALOUS, a. *mŏn′o-pĕt′ă-lŭs* [Gr. *monos*, alone; *pet′alon*, a leaf]: having the corolla in one piece, formed by the union of several petals, cohering so as to form a tube; gamopetalous.

MONOPHONIC, a. *mŏn-ō-fŏn′ĭk* [Gr. *monos*, alone, single; *phōnē*, sound]: in *mus.*, a term applied to a composition having but one part; single-voiced.

MONOPHTHONG, n. *mŏn′ŏf-thŏng* [Gr. *monos*, alone; *phthonggos*, a sound]: a simple vowel-sound; two vowels pronounced as one. MON′OPHTHON′GAL, a. consisting of a simple vowel-sound.

MONOPHYLETIC, a. *mŏn-ō-fī-lĕt′ĭk* [Gr. *monos*, alone, single; *phulē*, a tribe, a family]: of or pertaining to a single family. MONOPHYLET′IC HYPOTH′ESIS, n. the hypothesis of descent which endeavors to trace the origin of all individual groups of organisms to a single common species of Moneron, which originated by spontaneous generation; opposed to Polyphyletic.

MONOPHYLLOUS, a. *mŏn-ŏf′il-lŭs* or *mŏn′ŏ-fil′lŭs* [Gr. *monos*, alone; *phullon*, a leaf or blade]: one-leaved; in *bot.*, monosepalous; having an involucre composed of a single piece.

MONOPHYODONT, n. *mŏn′ŏ-fī′ō-dŏnt* [Gr. *monos*, single; *phŭō*, I generate; *odontes*, teeth]: a mammal which has only one set of teeth.

MONOPHYSITE, n. *mŏn-ŏf′ĭ-sīt* [Gr. *monos*, alone; *phusis*, nature]: one who maintains that Christ had one nature only, the human and divine united in one. The Monophysites were a widely ramified sect of the ancient church who held that Christ has only *one* nature, the human nature absorbed into the divine. Monophysite views were first decidedly put forward in the controversy against Nestorius. Cyril having expressed the opinion that the flesh of the Logos was essential to his personality, the archimandrite Eutyches (q.v.) went on to assert a deification or apotheosis of the flesh of Christ, and obtained the consent of a synod at Ephesus, 449, commonly called the 'Synod of Robbers,' to this doctrine (see EPHESUS, COUNCILS OF); but he and his adherents (at first called after him EUTYCHIANS) were condemned as heretics by the Council of Chalcedon (q.v.) two years later. It was after this council that the name *Monophysites* began to be used. The decision of the council, however—viz., that in Christ *two* natures, neither interfused, changed, nor divided, were united in *one* person, and constituted *one* hypostasis—was not adapted to allay, but rather to increase discord. Accordingly, the strife grew hotter. The Asiatic and Egyptian clergy, strongly opposed to Nestorianism, were generally inclined to Monophysite views, and received countenance from Emperor Basiliscus. After long and often bloody contests between the supporters of the opposite opinions, the Monophysites formally separated from the orthodox church. This separation took place in the first half of the 6th c.,

when the imperial protection hitherto bestowed on them was lost by the alliance of the emperors Justin and Justinian with the Latin Church. Besides, they had not maintained unity among themselves. As early as 482, when Emperor Zeno published his famous *Henoticon*, or formula of concord, it was accepted by several of the more moderate Monophysites. This roused the indignation of the extremer sectaries; they renounced fellowship with their laxer brethren, and formed a sect of their own. They were called *Akephaloi*, and formed the *ultras* among the Monophysites. Controversies arose also in 519 on the question, whether or not the body of Christ was corruptible. The Severians—adherents of Severus, deposed bishop of Antioch—affirmed that it was; the Julianists, or Gajanites, followers of Bp. Julianus or Gajanus, denied it. The former were consequently called (Gr.) *Phthartolatrists*, (Lat.) *Corrupticolæ* (Worshippers of the corrupt); the latter, *Aphthartodocetæ* (Believers or Teachers of Incorruption), and sometimes—as an incorruptible body could be only apparent, and not real—*Phantasiasts*. The *Aphthartodocetæ* split again on this other point—whether or not Christ's body was created; the *Aktistetoi* (Gr. *ktizō*, to create) asserting that it was not created, and the *Ktistolatrists*, that it *was*. The Severians, called also, after one of their bishops, *Theodosians*, finally got the upper hand, and excommunicated their opponents, including another sect, the *Agnoetoi*, who denied that Christ as a man was omniscient. About 560, the Monophysite Askusnages, and after him the Christian philosopher Philoponus, ventured to speak of the Three Persons in the Godhead as Three Gods. This, however, was reckoned heretical even by the Monophysites themselves, and was the occasion of a large recession to the bosom of the Catholic Church. Monophysite communities continued strongest in Egypt, Syria, and Mesopotamia, where they maintained a regular ecclesiastical order under their own patriarchs of Alexandria and Antioch; and after the Syrian, Jakob Baradæus (Al-Baradai, died about 578), had drawn up for them an ecclesiastical constitution, they formed the independent churches of the *Jacobites* and *Armenians*. See JACOBITE CHURCH: ARMENIAN CHURCH: EUTYCHES. The Coptic and Abyssinian churches also are Monophysite in doctrine.

MONOPLAST, n. *mŏn′ō-plăst* [Gr. *monos*, one; *plastos*, formed]: a naked non-vesicular body; an animal cell destitute of envelope. MONOPLASTIC, a. *mŏn′ō-plăs′tĭk*, having one primary form.

MONOPODIA, n. *mŏn′ō-pō′dĭ-ă* [Gr. *monos*, one; *pous* or *poda*, a foot]: a monstrosity having one foot only. MON′OPO′DIUM, n. *-pō′dĭ-ŭm*, in *bot.*, an elongated axis giving off lateral structures having a similar nature. MON′OPO′DIAL, a. *-pō′dĭ-ăl*, applied to an indefinite or centripetal inflorescence; racemose.

MONOPOLI, *mō-nŏp′o-lē:* town of s. Italy, province of Bari, on the Adriatic coast, in a pleasant and healthful plain, 28 m. e.s.e. of Bari. It is supposed to be of Grecian origin, the name in Greek signifying the *solitary city.* It is surrounded by walls, and has a fortress constructed 1552 by Charles V. The neighboring territory yields an immense quantity of olive-oil. Pop. of M. abt. 14,000.

MONOPOLIZE, v. *mŏ-nŏp′ō-līz* [F. *monopoliser;* Sp. *monopolizar*, to monopolize—from L. *monopōlĭŭm;* Gr. *monopōlĭŏn*, the right of monopoly—from Gr. *monos*, alone; *pōlĕō*, I sell]: to get the exclusive right of selling; to purchase or obtain possession of the whole of anything with the view of selling at an advanced price and controlling the market; to obtain or engross the whole. MONOP′OLIZING, imp.: ADJ. obtaining the sole power or right; engrossing. MONOP′OLIZED, pp. *-līzd.* MONOP′OLIZER, n. *-lī-zér*, or MONOP′OLIST, n. *-lĭst*, one who has obtained the exclusive power to trade in a certain article, or who, by buying up the whole of it, has the command of the market at some place. MONOPOLY, n. *mŏ-nŏp′ō-lĭ*, the possession of exclusive dealing in the sale of an article, which may be held by right of purchase, by patent, or simply by means of its superior manufacture; formerly a grant from the crown of the right of exclusive trading in some article.

MONOP′OLY: limitation to one or more persons of the right or power to conduct business as a trader. It is generally used in a bad sense to express something injurious, but economic science has lately very much narrowed the field over which its injurious character is supposed to extend. In the first place, to be injurious it must be created by force or in some unnatural way; if it come in the natural course of trade, it is generally beneficial. Thus, to a village where three or four traders have conducted a small lazy business, drawing large profits, there comes a capitalist, who sets up a large concern on the ready-money system, and, by selling good articles at a low rate, absorbs all the business. He is of course abused as a monopolist by the ineffective persons whom he has superseded; but his presence is a benefit to the community generally. If, however, he had gone to the village, not to compete with others, but with a government patent in his pocket securing to him the exclusive trade of the village, then, as he could sell at his own price, and make a fortune without trouble, he would of course be, like the old royal monopolists, a calamity to the people.

A careful distinction must be preserved between monopoly and property—that is to say, an exclusive right to *trade* must be separated from an exclusive right to *possess*—for, while the law of property exists, possession will always be exclusive. If, then, a particular trade can be conducted only with large capital, it must fall to those who either singly, or by co-operation, can com-

mand that capital; and the answer to all complaints on the part of others is, that since capitalists can best serve the public in that particular, it is best for the public that capitalists should be allowed to do so.

A deal of legislation was wasted by our ancestors in Britain in enactments to prohibit people from creating monopolies by that fair competition which is now considered the true healthful development of trade. For some account of them and of their repeal, see ENGROSSING. When British trade was increasing in the 16th c., it found some old powers alleged to be inherent in the royal prerogative for conferring exclusive trading rights, which led to much oppression and loss. In Queen Elizabeth's parliament of 1597, a complaint was made that, for the benefit of favored courtiers, oppressive monopolies had been granted, not only for the sale of foreign luxuries, but for salt, leather, coal, and other articles of ordinary consumption. Queen Elizabeth said she 'hoped her dutiful and loving subjects would not take away her prerogative, which is the choicest flower in her garden, and the principal and head pearl in her crown and diadem.' Parliament returned to the charge, however, 1601, when, on the reading over of the list of monopolies, a theatrical scene was introduced by a member calling out: 'Is not bread among the number?' and on this producing a sensation, continuing: 'Nay, if no remedy is found, bread will be there before the next parliament.' In 1621, parliament took proceedings against Sir Giles Mompesson, charged with an oppressive use of his patent's monopoly. Four years afterward, an act was passed limiting this power in the crown. It leaves the right to grant only a limited monopoly in the manufacture of his invention to any inventor, and this is the origin of the present patent law: see PATENT.

MONOPTERAL, a. *mŏn′op′tĕr-ăl*, or MONEPTERAL [Gr. *monos*, alone; *pteron*, a wing]: one-winged; used to designate a temple without a cella, composed of columns arranged in an open circle and supporting a cupola or a conical roof.

MONOPTOTE, n. *mŏn′op-tōt* [Gr. *monos*, alone; *ptōtos*, fallen, or apt to fall]: in *gram.*, a noun having but one oblique case-ending.

MONORGANIC, a. *mŏn′ŏr-găn′ĭk* [Gr. *monos*, alone; *or′gănon*, an organ]: in *med.*, belonging to or affecting one organ, or a set of organs.

MONOSEPALOUS, a. *mŏn′ō-sĕp′ă-lŭs* [Gr. *monos*, alone; *sepălon*, a sepal]: having the sepals which compose a calyx united at their edges or margins so as to form a tube; gamosepalous.

MONOSIS, n. *mŏ-nō′sĭs* [Gr. *monos*, one, single]: in *bot.*, the isolation of an organ from the rest.

MONOSPERMOUS, a. *mŏn′ō-spĕr′mŭs*, or MONOSPER′MAL, a. *-măl* [Gr. *monos*, alone; *sperma*, seed]: one-seeded; applied to a fruit having only one seed. MON′OSPERM, n. *-spĕrm*, a plant of one seed only.

MONOSPHERICAL, a. *mŏn′ō-sfĕr′ĭ-kăl* [Gr. *monos*, alone; *sphaira*, a sphere or globe]: consisting of one sphere or globe.

MONOSTACHOUS, a. *mŏn-ŏs′tă-kŭs* [Gr. *monos*, one; *stachus*, an ear or spike of corn]: in *bot.*, disposed or arranged in one spike only.

MONOSTICH, n. *mŏn′ō-stĭk* [Gr. *monos*, alone; *stichos*, a verse]: a poem complete in one verse.

MONOSTOMUM, n. *mŏn-ŏs′tŏ-mŭm*, MONOS′TOMA, n. plu. *-tŏ-mă* [Gr. *monos*, one; *stoma*, a mouth]: genus of trematoid worms, so called from having only a single sucker, which is situated anteriorly, and surrounds the mouth. It belongs to the *Trematoda Digenea* (of Van Beneden), all of which present the phenomena of alternation of generations, the earlier or larval forms occurring chiefly in mollusks, while the perfect worms are found, mostly, in vertebrated animals. Among the species of this genus occur *M. flavum*, found in waterfowl (the larva being the *Cercaria ephemera*, which is common in *Planorbis*, etc.), *M. mutabile*, found in various birds, and *M. lentis*. The last-named species derives its specific name from its having been found by Von Nordmann in a lens extracted in a case of cataract. Cobbold and other distinguished helminthologists are inclined to believe that this is not an independent species, but identical with the *Distoma ophthalmiobium* of Diesing.

MONOSTROPHIC, a. *mŏn′ō-strof′ĭk* [Gr. *monos*, alone; *strophē*, a turning]: not varied in measure; having one strophe only.

MONOSYLLABLE, n. *mŏn′ō-sĭl′lă-bl* [L. *monŏsyllăbus*, of one syllable—from Gr. *monos*, alone; *sullābē*, a syllable]: a word of one syllable. MON′OSYLLAB′IC, a. *-lăb′ĭk*, consisting of words of one syllable.

MONOTESSARON, n. *mŏn-ō-tĕs′sa-rŏn* [Gr. *monos*, alone, single; *tessares*, four]: a harmony of the four gospels; a single narrative compiled from a collection of the four gospels.

MONOTHALMIC, a. *mŏn′ō-thăl′mĭk* [Gr. *monos*, single; *thalămos*, a chamber]: in *bot.*, applied to frnits formed from one pistil. MON′OTHAL′AMOUS, a. *-thăl′ă-mŭs*, one-chambered—applied to shells.

MONOTHECAL, a. *mŏn′ō-thē′kăl* [Gr. *monos*, single; *thēkē*, a sheath]: in *bot.*, having a single loculament.

MONOTHEISM, n. *mŏn′ō-thē-ĭzm* [Gr. *monos*, alone; *Theos*, God]: doctrine of, or belief in, the numerical unity (*unus numero*) of the Godhead; or belief in and worship of only one living God. It is thus the opposite of *Polytheism* (q.v.). See GOD. The 'doctrine of the Trinity,' being thought by some to be incompatible with the monotheism taught by Jesus Christ, is therefore rejected by them as no part of his teaching: see UNITARIANS. While some theological statements of the Divine Triunity have not been sufficiently guarded on this point,

it is yet plain that a real belief in a Tri-unity in God (whether it be true or not) can be held with no approach to tritheism or to polytheism. Mohammedans and Jews hold the doctrine of the 'unity of God,' even more rigorously in some respects than modern Christians, at least they reject with vehemence the least approach to a Trinitarian conception of the Deity: see TRINITY. The majority of mankind are polytheists. MON'OTHEIST, n. *-thē-ĭst*, one who believes that there is but one God. MON'OTHEIS'TIC, a. *-ĭs'tĭk*, pertaining to monotheism.

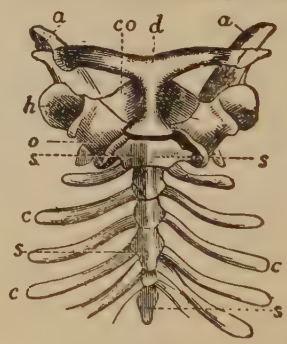
MONOTHELITES, n. plu. *mŏn-ŏth'ē-līts* [Gr. *monos*, single; *thĕlō*, I wish, I will]: a heretical sect of the 7th century who taught that Christ had two natures but only one will, the human will being absorbed in the divine. MONOTH'ELITE, a. holding the doctrine that the human will of Christ was absorbed in the divine. MONOTH'ELISM, n. *-ĕl-ĭzm*, a modification of Eutychianism, introduced after the condemnation of that doctrine by the Council of Chalcedon, and which consisted in maintaining that, though Christ had two natures, the human and the divine, yet these natures possessed or acted by but a single will, the human will being merged in the divine, or absorbed by it. The author, at least the most active propagandist of this doctrine, was Sergius, Patriarch of Constantinople, who obtained for it the support of Emperoror' Heraclius; and its progress was materially forwarded by the silence which, at the instance of Sergius, and under his representations, the pope, Honorius (q.v.), was induced to maintain regarding the question. The doctrine was formally condemned in the sixth general council at Constantinople 680, with which condemnation it is commonly said that the early controversies on the incarnation were ended. The declaration of that council was that there are in Christ two natural wills and two natural operations thereof, without division, conversion, or change, with nothing like antagonism or confusion of the two; but that at the same time the human will in Christ could not come into collision with his divine will, but is in all things subject to it. See EUTYCHES: MONOPHYSITES.

MONOTOMOUS, a. *mŏ-nŏt'ō-mŭs* [Gr. *monos*, alone; *tŏmē*, a cutting]: in *min.*, having its cleavage distinct in one direction only.

MONOTONE, n. *mŏn'ō-tōn* [Gr. *monos*, alone; *tonos*, a sound]: a succession of sounds having the same pitch; an unvaried tone of voice. MONOTONOUS, a. *mŏ-nŏt'ō-nŭs* [Gr. *monot'ŏnos*, of the same tone]: having a continued sameness of sound; continued with dull uniformity. MONOT'ONOUSLY, ad. *-lĭ*. MONOTONY, n. *mŏ-nŏt'ō-nĭ*, dull uniformity of tone or sound in speaking, reading, or singing; sameness; a want of variety.

MONOTREMATOUS, a. *mŏn′ō-trĕm′ā-tŭs* [Gr. *monos*, single; *trema*, a hole or opening]: applied to the lowest mammals, viz., the Ornithorhynchus and the Echidna, which resemble birds in having a cloaca only, or one external outlet for excrements and genital products. MONOTREME, n. *mŏn′ō-trēm*, one of the MON′OTREM′ATA, *-trĕm′-ă-tă*, or monotrematous animals. MONOTREMATA, lowest order of mammalia, many of whose characteristic points indicate an approximation to birds. The skull is smooth; the brain-case very small as compared to the face; the snout much prolonged, and the jaws unprovided with soft movable lips, and not furnished with teeth. (In the ornithorhynchus, there are two horny plates in each half-jaw, which act as teeth, while in the echidna even these substitutes for teeth are wanting.) The cranial bones coalesce, as a bird's, at a very early period, and leave no signs of sutures. The external ear is altogether absent; while the eyes, though small, are perfetly developed.

The bones of the shoulder, forming the scapular arch, are unlike those of any other mammals, and in some respects resemble those of birds, and in other respects those of reptiles. At the top of the sternum is a T-shaped bone, formed by the union of the two clavicles, corresponding to the *furculum* in the bird's skeleton. The coracoid bones, which in other mammals are mere processes of the scapula, are here extremely large, and assist, as in birds, in strengthening the scapular arch.



Monotremata:
The breast-bone and collar-bone of the Echidna.
(From Milne-Edward's *Zoology*.)

a, acromi or process of scapula; *d*, bone corresponding to the usual collar-bones of mammals; *h*, cavity for the articulation of the head of the humerus; *o*, the prolongation of the scapula to the sternum; *co*, the coracoid bone; *s*, the sternum; *c*, ribs.

while the scapulæ themselves are produced beyond the socket of the humerus (the glenoid cavity), so as to articulate with the sternum. The pelvis is provided with marsupial bones, though these animals do not possess a

pouch. The feet have five toes, armed with long nails; in addition to which, the hind-feet of the males are provided with a perforated spur-like weapon connected with a gland. The Australian aborigines believe the wounds made by this spur to be poisonous; but there is no scientific evidence of the fact. The ovaries are analogous to those of birds, the right ovary being comparatively undeveloped, while the left forms a racemiform mass. The orifices of the urinary canals, the intestinal canal, and the generative canal, open, as in birds, into a common cloaca, from which circumstance the order *Monotremata* derives its name. The mammary glands, of which there is only one on each side, are not provided with nipples, but open by simple slits on each side of the abdomen.—This order includes only two or three species, all natives of Australia, or Van Diemen's Land, which, however, form two families—the *Ornithorhynchidæ* (see DUCK-BILL), and the *Echidnidæ* (see ECHIDNA).—No fossil remains of any animal of this order have as yet been discovered.

MONOTRIGLYPH, n. *mŏn′ō-trī′glĭf* [Gr. *monos*, alone, and Eng. *triglyph*]: such an intercolumniation in the Doric order as brings only one triglyph over each column.

MONOTROPA, *mŏn-ŏt′-ro-pă:* genus of Ericaceæ: low herbs, parasitic on roots or feeding on decay, the whole plant without green chlorophyll, its food being organic. The petals and leaves are scale-like. The INDIAN PIPE (*M. uniflora*) is waxy-white, with one flower. The PINE-SAP (*M. hypopitys*), white, brown, or red, has a raceme of flowers. The s. *Sweet Pine-sap*, with violet-scented bell-flowers, is rare; as also *Pine-drops* (q.v.).

MONOXIDE, n. *mŏn-ŏks′īd* [Gr. *monos*, only, and Eng. *oxide*]: one of a series of oxides containing 1 equivalent of oxygen and 1 equivalent of another element; DIOXIDE contains 2 of oxygen and 1 of another element; TRIOXIDE contains 3 of oxygen and 1 of another element; SESQUIOXIDE, a compound intermediate between a *monoxide* and a *dioxide*, that is, containing 1½ equivalent of oxygen to 1 of another element; thus CARBON MONOXIDE is an oxide containing 1 equivalent of carbon and 1 of oxygen.

MONREALE, *mōn-rā-ā′lā:* city of the island of Sicily, province of Palermo, 5 m. s.w. of the city of Palermo, on the flank of a steep hill. It has a cathedral, a palace, several conventual establishments, and possesses a healthful climate. The cathedral, begun about 1170, was and still is one of the most magnificent in Europe. Its extent is 80,630 sq. ft. The archiepiscopal palace and monastic buildings, were grand and splendid, but have mostly been rebuilt; though the cloister, remarkable for beauty, has been preserved. Its chief source of wealth is its export trade in oil, corn, and fruit; almonds being one of its most important products. Pop. 13,496.

MONRO, *mŭn-rō'*, ALEXANDER: Scottish anatomist: b. London 1697, Sep. 8; d. Edinburgh, 1767, July 10. He studied at Edinburgh, afterward in London under Cheselden, and still further both in Paris and Leyden, at the former under Bouquet, and at the latter under Boerhaave. On his return to Edinburgh in 1719 he was made professor of anatomy and surgery to the surgeon's company; in 1720, the first university professor of anatomy, though not inducted till 1725. He attended the wounded on the field at Prestonpans 1745, Sep. 21, and was an accurate observer, having studied the effects of the presence of solid bodies in the vermiform appendix, and otherwise anticipated later views. He resigned his professorship in 1764. His principal work is *Osteology, a Treatise on the Anatomy of the Human Bones* (1726), once a popular text-book.

MONRO, ALEXANDER: known as Secundus; Scottish anatomist: b. Edinburgh, 1733, May 20; d. there 1817, Oct. 2. He was son of Alexander Monro (1697—1767) (q.v.). Educated at Edinburgh University (M.D. 1755), he also studied on the continent, and in 1759-1808 lectured at Edinburgh. In 1783 he described the communication between the lateral ventricles of the brain, known as the foramen of Monro. He published *Three Treatises on the Brain, the Eye, and the Ear* (1797) and other medical works.

MONRO, ALEXANDER: known as *Tertius;* Scottish anatomist: b. Edinburgh 1773, Nov. 5; d. Craiglockhart, near Edinburgh, 1859, Mar. 10. He was the son of Alexander Monro (1733—1817) (q.v.). He obtained his M.D. at Edinburgh in 1797, was appointed conjoint professor with Monro *Secundus* of medicine, surgery and anatomy, and in 1817-46 was sole professor. His works include *Observations on Crural Hernia* (1803), and other publications, of no permanent value.

MONROE: city, parish-seat of Ouachita parish, La.; on Washita river, and on the Missouri Pacific and the Vicksburg, Shreveport & Pacific railroads; about 155 m. n. by w. of Baton Rouge and 55 m. e. of Shreveport. It has steamer connections with a number of towns on the Washita river. It is an agricultural section in which raising cotton and lumbering are the chief industries. There are cottonseed-oil mills, cotton compresses, brick yards, lumber mills, and wooden ware factories. There is a large trade in cotton and lumber. Pop. (1900) 5,428.

MONROE: city, county-seat of Monroe co., Mich.; on the Raisin river, and on the Michigan Southern, the Père Marquette, the Michigan Central, and the Lake Shore railroads; about 40 m. s.w. of Detroit and 85 m. s.e. of Lansing, the capital of the state.

It was settled in 1794 by people from Canada, and was first called Frenchtown. In 1815 the name was changed to Monroe in honor of James Monroe (q.v.). It was chartered as a city in 1836. Here took place 1813.

Jan. 22-23, the 'Battle of Raisin River.' The American losses in the battle were 397 killed, 537 captured; and the British losses were 24 killed and 158 wounded. Only 33 of the Americans escaped. A number of the American wounded and prisoners were left here by the British, in charge of a few soldiers. The Indians attacked and massacred all of them. The battle cry used later in the war of 1812 and afterward when disputes arose with the British, was, 'Remember the River Raisin.'

The city is in a fertile agricultural region and a trade centre for a large section of the southeastern part of the state. Its principal manufactures are flour, lumber, paper, paint, brick, agricultural implements, stoves, furnace products, furniture, and canned goods. The nurseries nearby and the fisheries give employment to a number of people. The chief buildings are the court-house, opera house, armory, and two orphan asylums, a home for the aged, St. Mary's Academy, a public library, and a convent. It has the mother house of the Sisters of the Immaculate Heart of Mary, a teaching order of sisters who have schools in various parts of the country, and whose pupils number about 10,000. In connection with the convent and academy are a large library and a fine museum. Pop. (1900) 5,043.

MONROE: city, county-seat of Union co., N. C.; on the Seaboard Air Line railroad; about 120 m., in direct line, s.w. of Raleigh. It is in a cotton growing region, and nearby are gold mines. The chief industrial establishments are cotton mills, cotton gins, lumber mills, and iron works. The trade is principally in cotton, iron products, lumber, and tobacco. Pop. (1900) 2,427.

MONROE: city, county-seat of Green co., Wis.; on the Chicago, Milwaukee & St. Paul and the Illinois Central railroads; about 40 m. s. by w. of Madison. It is situated in an agricultural and stock-raising region, but its manufactures are quite important. In 1859 it was incorporated as a village, and chartered as a city in 1882. The chief manufactures are creamery products, condensed milk, machine-shop products, wagons, carriages, lumber, and foundry products. The trade is principally in the manufactures of the city, farm and dairy products and live-stock. It has good schools and a fine public library which contains about 5,000 volumes. Pop. (1900) 3,927.

MONROE, Harriet: American author: b. Chicago, Ill., 1860, Dec. 23. She was graduated from the Visitation Academy, Georgetown, D. C., in 1879 and has since devoted herself to literature. In 1889 she wrote the text of the cantata given at the opening of the Chicago Auditorium and in 1891 wrote by request of the committee the *Columbian Ode*, which was sung at the dedicatory ceremonies at the World's Columbian Exposition in 1892. She has published: *Valeria and Other Poems* (1892); *John Wilborn Root—a Memoir* (1896); *The Passing Show* (1903); etc.

MONROE, *mŭn-rō′*, JAMES: fifth president of the United States: 1758, Apr. 28—1831, July 4 (pres. 1817–25); b. Westmoreland co., Va.; descended, according to the family tradition, from a Capt. Hector M. of the army of Charles I., a Scotch cavalier who emigrated with other cavaliers to Va. M. entered William and Mary College, but left it at the outbreak of the revolution, 1776, to join the continental army as lieut.; was wounded in the shoulder while leading the advance-guard at the battle of Trenton; lost his rank by serving as an aid 1777–8, taking part in the battles of Brandywine, Germantown, and Monmouth. After the war he studied law under Jefferson, who remained his close friend till his death, and who exerted a great influence upon him. In 1782 M. was elected to the assembly from King George co. and, though but 23 years old, was appointed by that body to the executive council. He was chosen a delegate to congress in 1783, and was active in the movement that led to the convention at Annapolis and the adoption of the federal constitution. He later, however, opposed its ratification, and took sides with the states' rights men. He was active in devising a system for the colonization of the public lands; was on the commission to settle the boundary between Mass. and N. Y.; and insisted on maintaining the right of the United States to navigation on the Mississippi. M. was a strong anti-federalist, vigorously opposing the administrative policy of Washington, and the financial policy of Hamilton. He had married in 1785, and his turn in congress expiring next year, he settled in Fredericksburg, Va.; but, 1787, was re-elected to the general assembly, and, 1788, a delegate to the constitutional convention. Though one of the minority opposed to ratification, he was one of the first to hold office under the new constitution, being selected by the legislature to fill the vacancy in the senate caused by Grayson's death. He was senator 1790, Dec.—1794, May, when he was sent by Washington as minister plenipotentiary to France, where he was so popular as to be suspected of French sympaties by the administration, and, 1796, Aug., he was recalled. 1799–1802 he was gov. of Va.; and 1803 was appointed by Jefferson minister to France to negotiate the purchase of Louisiana, which he, with the resident minister, Mr. Livingston, succeeded in doing for $15,000,000, two weeks after M.'s arrival in Paris. The same year he was made minister to England to secure measures against the impressment of seamen, and then to Spain to settle the disputes between that country and the United States with reference to the boundaries of La. In 1806 he was sent again to England to conclude, with Mr. Pinckney, negotiations for securing neutral rights. His mission was not satisfactory, and 1807 he was recalled to America. Here he was urged as a candidate for the presidency, but withdrew his name; and Madison having been elected, 1809, he made M. sec. of state, 1811; besides which he had also to perform the duties of sec. of war after the capture of Washington by

JAMES MONROE.

the British 1814. He was elected to the presidency 1816, receiving 183 electoral votes against 34 for Rufus King, the federalist candidate. During his administration the states of Miss., Ill., and Maine were admitted into the Union; Fla. was purchased from Spain; and a treaty was concluded with England regarding the Newfoundland fisheries and the return of fugitive slaves. In 1820 he was re-elected with only one electoral vote in opposition to him. In 1821 Mo. was admitted into the Union, resulting in the 'Missouri Compromise,' by which, while slavery was permitted in Mo., it was forever prohibited north of lat. 36° 30′ elsewhere. It was during his second term that the independence of Mexico was recognized, and 1822 that of the provinces in S. America formerly under Spanish dominion. In 1823, Dec. 2, he issued his famous annual message containing the declaration of what has since been known as the 'Monroe doctrine,' and which defines the policy of the United States in its foreign relations. That policy is declared to be one of non-interference with the affairs of European nations, and insistance on a similar non-interference on the part of European governments with the affairs on the American continent—except as relates to the Brit. possessions in Canada. It declares that no European powers can 'extend their political system to any portion of either [American] continent, without endangering our peace and happiness. . . . It is equally impossible, therefore, that we should behold such interposition, in any form, with indifference.' After M.'s term of office expired, 1825, he retired to his home at Oak Hill, London co., Va., but continued serving his fellow citizens in various capacities, as justice of the peace; and 1829 as pres. of the convention to revise the old state constitution, which position, however, ill-health compelled him soon to resign. His wife died 1830, which, added to pecuniary embarrassment—the result in part of profuse hospitality—constrained him to remove to the home of his son-in-law, Samuel L. Gouverneur, in New York, where he died a year later. His body was removed from New York, and reinterred with imposing ceremonies in Hollywood Cemetery, Richmond, Va., 1858, July 5. It may be true, as Madison thought, that the country never fully appreciated M.'s services. His intellect was not brilliant, he had no gift as orator, he was influenced by strong party-feeling; still he was, through all, honestly desirous of serving his country. He developed the resources of the nation more than any one before him; the army and navy were enlarged and thoroughly organized; commerce was protected; the nation's finances improved; and the public service made more vigorous and efficient. The full story of his life, says his biographer, Prof. Gilman, in the 'American Men of Letters series,' 'will always reveal the mind and heart of a patriot, in new and trying situations, true to the idea of American independence from European interference.'

MONROE′ DOCTRINE: see MONROE, JAMES.

MONRO'VIA: capital of Liberia (q.v.).

MONS, *mōngss* (Flem. *Berghen*): important town of Belgium (formerly fortified), cap. of the province of Hainault; on the Trouille, 35 m. s.w. of Brussels. Its fortifications were renewed and strengthened after 1818; but in 1866 in accordance with new arrangement for the defense of the country, they were demolished. The immediate vicinity can be laid under water by altering the course of the Trouille. The *Canal de Condé* connects the town with the Scheldt, and there is communication by railway with Brussels, Valenciennes, Charleroi, etc. Its principal architectural ornament is the cathedral of St. Waudru, dating from the 15th and 16th c.—a masterpiece of Gothic. The chief manufactures are woolen and cotton goods, cutlery, small-wares, and sugar-refining. The vicinity forms an extensive coal-field, with about 400 pits, which give employment to the people of six large villages with a pop. in all of nearly 70,000; the annual product of coal is two to three millions of tons. There is large trade in coals, flax, hemp, horses, and cattle. Pop. (1901) 26,989. M., supposed to occupy the site of a Roman station, was made cap. of Hainault by Charlemagne 804. During the 17th and 18th c., it was frequently the object of contest between France and Austria.

MONSEIGNEUR, n. *mŏng-sēn'yŭr* [F. *monseigneur*—from *mon*, my; *seigneur*, lord: It. *monsigno're*, my lord—from *signore*, lord]: in *France*, a title of courtesy properly belonging to princes, cardinals, and bishops; but in courtesy prefixed also to names of persons of high rank, or to titles of noblemen; a title of bishops, etc., in France; my lord; your grace or highness. This title was not applied to bishops till near the beginning of the 18th c., at which time they acquired it by general agreement so to address each other: its use was forbidden to them in France by the convention 1801. MESSEIGNEURS, n. plu. *mĕs-sēn'yĕrz*, my lords. MONSIGNOR, n. *mŏn-sēn'-yŏr*, or MONSIGNORE, n. *mŏn'sēn-yōr'ā*, ordinary title of a bishop in the Rom. Cath. Chh.; honorary title conferred on certain priests attached to the Court of Rome: usual abbreviation, *Mgr.*, plu. *Mgrs.*

MONSELICE, *mōn-sā-lē'chā:* town of n. Italy, 13 m. s.e. of Padua. Pop. 3,160.

MONSIEUR, n. *mŏs'sŭr* [F. *monsieur*—from *mon*, my; *sieur*, sir, master]: sir; Mr.; also, denoting a Frenchman, in slight contempt. MESSIEURS, n. plu. *mĕs'sū*, sirs. The title *Monsieur*, formerly applied in France to men of middle rank, is now universally applied to gentlemen. Its abbreviation is *M.*, sometimes *Mons.*; plu. *MM.*, sometimes *Messrs.* It is used also as a prefix to titles of rank or of office (in the latter case corresponding to our Mr. President, Mr. Secretary, etc.). In the middle ages it was prefixed to the title 'Saint', also to the names of popes and royal persons when spoken of. The oldest brother of the French king had it as his special title, being often spoken of as simply 'Monsieur'.

MONSIGNOR, etc.: see under MONSEIGNEUR.

MONSON, *mŭn'son:* town in Hampden co., Mass., 15 m. e. of Springfield, on the Boston and Albany, and New London and Northern railroads, 80 m. w.s.w. of Boston. It has valuable quarries of gneiss, manufactories of woolen goods, and of hats and bonnets, a national bank, several churches, a state school for the children of paupers of foreign birth, and a long-established, widely known, and successful academy of high grade, at which preparation for entering college has been made by many men of note in America.—Pop. (1870) 3,204; (1880) 3,758; (1890) 3,650; (1900) 3,402.

MONSOON, n. *mŏn-sôn'* [It. *monsone;* F. *mousson;* Port. *monçao*, a monsoon—from Ar. *maasaan*, or *mausim*, season]: periodical wind of the Indian and Arabian seas, blowing regularly from the s.w. from Apr. to Oct., and from the n.e., from Oct. to Apr. The existence of these winds was made known to the Greeks during the Indian expeditions of Alexander, and by this knowledge, Hippalus was emboldened to sail across the open sea to Muzeris, the emporium of Malabar. The monsoons depend, in common with all winds regular or irregular, on the inequality of heat at different places and the earth's rotation on its axis; but particularly they are occasioned by the same circumstances which produce the trade-winds and the land and sea breezes, being, in fact, the combined effect of these two sets of causes.

If the equatorial regions of the earth were entirely covered with water, the trade-winds (see TRADE-WINDS) would blow constantly from the n.e. in the north, and from the s.e. in the south of the torrid zone, with a belt of variable winds and calms interposed; the whole system, following the sun's course, moving northward from Dec. to June, and southward from June to Dec. But, especially in the e. hemisphere, large tracts of land stretch into the tropics, and give rise to the extensive atmospheric disturbances for which those parts of the earth are remarkable. During the summer half of the year, n. Africa and s. Asia are heated to a higher degree than the Indian Ocean, while Australia and s. Africa are much colder. As the heated air of s. Asia expands and rises, and the colder air from the s. flows in to supply its place, a general movement of the atmosphere of the Indian Ocean sets in toward the n., thus causing the wind to come from a *southerly* direction; but as the air comes from those parts of the globe which revolve more quickly to those which revolve more slowly, an eastward movement will be communicated to the wind, causing it to come from a *westerly* direction; and the combination of these two directions results in the s.w. monsoon, which prevails there in summer. Since, during winter, s. Asia is colder than the Indian Ocean, which, again, in its turn, is colder than s. Africa, a general motion of the atmosphere sets in toward the s. and w.: as this is in the same direction as the ordinary trade-wind, the effect in winter

is not to change the direction, but only to increase the velocity of the trade-wind. Thus, while s. of the equator, owing to the absence of sufficiently large tracts of land, the s.e. trade-winds prevail throughout the year; on the n. of the equator we find the s.w. monsoon in summer, and the n.e. in winter; it being only in summer and n. of the equator that great changes are effected in the direction of the trade-wind.

Similar, though less strongly-marked monsoons prevail off the coasts of Upper Guinea in Africa, and Mexico. The e. and w. direction of the shores of these countries, or the large heated surfaces n. of the seas which wash their coasts, produce, precisely as in the case of s. Asia, a s.w. monsoon in summer. As might have been expected, the monsoon off the coast of Mozambique is easterly, and that off the coast of w. Australia northwesterly. The trade-winds also undergo considerable change in their direction on the coasts of Brazil, Peru, Lower Guinea, etc. These winds, though sometimes considered monsoons, are not truly such, for they do not change their directions periodically, so as to be opposite to each other, like true monsoons, but only veer through a few points of the compass. For a fuller account of these partial deflections, see TRADE-WINDS.

In India, in Apr., the n.e. monsoon changes into the s.w.; and in Oct., the s.w. into the n.e. These times depending on the course of the sun, consequently varying with the latitude, are called the breaking up of the monsoons, and are generally accompanied by variable winds, by intervals of calm, and by furious tempests and hurricanes.

Monsoons, when compared with the trade-winds, are seen to act a most beneficial and important part in the economy of the globe. Their greater velocity, and the periodical changes in their direction, secure increased facility of commercial intercourse between different countries. But the full benefits following in their train are not seen unless they be considered in their relation to the rainfall of s. Asia. Indeed, the fertility of the greater part of this fine region is due entirely to the monsoons; for if the n.e. trade-wind had prevailed there throughout the year, central and w. India, and many other regions, would have been scorched and barren saharas. The rainfall of India depends entirely on the monsoons. The coast of Malabar has its rainy season during the s.w. monsoon, which brings thither the vapors of the ocean. On the Coromandel coast, on the other hand, it is the n.e. monsoon which brings the rain from the Bay of Bengal. The two coasts of Hindustan have therefore their seasons reversed, the dry season of the one corresponding with the wet season of the other.

MONSTER, n. *mŏn'stėr* [F. *monstre*—from L. *monstrum*, anything strange or wonderful: Sp. *monstro*]: something out of the common order of nature; a creature with parts not natural, or greatly malformed (see MONSTROSITY, in Anatomy); a person looked upon with horror on account of extraordinary crimes, or of deformity, or power to do harm; anything uncommonly large: V. in *OE.*, to put out of the common and natural order of things. MON'STERING, imp. MON'STERED, pp. *-stėrd:* ADJ. very great in size or numbers. MONSTROUS, a. *mŏn'strŭs*, unnatural in form; huge; enormous; shocking; hateful; horrible: AD. in a monstrous manner; exceedingly; very much. MON'STROUSLY, ad. *-lĭ*. MON'STROUSNESS, n. *-nĕs*, the state of being monstrous. MONSTROSITY, n. *mŏn-strŏs'-ĭ-tĭ*, state of being monstrous; an unnatural production; that which is monstrous; a monster: see MONSTROSITY, in Anatomy: MONSTROSITY, in Botany.

MONSTRANCE, n. *mŏn'străns* [L. *monstrans*, showing]; called also OSTENSORY: in the Rom. Cath. Church, the sacred utensil employed for presenting to view the consecrated Host (q.v.) for the adoration of the people, as well while it is carried in procession, as when it is exposed upon the altar on occasions of special solemnity and prayer. The use of the M. probably dates from the establishment of the festival of Corpus Christi, 13th c. It consists of two parts, the foot or stand upon which it rests, and the repository or case in which the host is exhibited. The latter contains a small semi-circular holder called the *lunula*, or crescent, in which the host is fixed; and it appears anciently to have been of a cylindrical or tower-shaped form, in the central portion of which, consisting of a glass or crystal cylinder, the host was placed. At present, it is more commonly in the form of a star or sun with rays, the central portion of which is of glass or crystal, and serves to permit the host to be seen. This portion, or at least the crescent, is of gold or of silver gilt; the rest is generally either of the precious metals, or at least gilt or silvered, though the lower portion is occasionally of bronze artistically wrought. In many cases, it is of most costly materials and workmanship. The M., like the other vessels used in the Eucharistic service, is consecrated by a bishop, or a priest delegated by a bishop. By a peculiar usage of the city of Lucerne, in Switzerland, the Eucharist is always carried in the M., when being borne to the sick.

Monstrance.

MONSTROSITY, in anatomy: unnatural malformation at birth: term applied to an infant, or the young of any animal, which comes into the world impressed with the morbid changes that occur in fetal life, and of which it has never been observed that they have originated in the same way after birth. The term monster has frequently the same application. Monsters were formerly regarded as prodigies of nature; and in the dark ages, their occurrence in the human species was usually ascribed to the intercourse of demons with witches. It is now perfectly understood that the formation of those apparently anomalous beings may be accounted for by the same laws as those which govern the formation of perfect individuals—the only difference being that these laws in the case of monstrosity are more or less arrested or otherwise perverted.

Among principal causes of monstrosity are: 1. Something deficient or abnormal in the generative matter of one or both parents, because (see HEREDITY) malformations are frequently transmitted from parents to the children. Here the morbid change is impressed on the fetus at the moment of impregnation. 2. Some morbid condition of the maternal organs or constitution may exercise a disturbing influence upon development. 3. Diseases and abnormal states of the placenta, of the membranes of the ovum, and of the umbilical cord, may induce arrest of development; for example, it may be easily understood how abnormal shortness of the cord may favor the origin of fissure of the abdomen; while a cord of disproportional length may coil round one of the extremities, and by constriction may dwarf it, or even amputate it. 4. Morbid influences acting directly on the fetus—e.g., mechanical injuries and diseases affecting it—are most frequent causes of malformations. From the experiments of several observers, it has been shown, that by submitting hen's eggs to various mechanical influences during incubation, the development of the embryo may be interrupted, or modified in such a manner as to give rise to malformations; and many observations tend to prove, that mechanical influences affecting the womb (kicks, blows, or falls) in the early months of pregnancy, may produce certain malformations, by causing arrest of development. Moreover, the fact that certain malformations usually occur only in twin or triplet pregnancies, favors the view, that certain monstrosities are due to pressure and confined space. The influence of 'maternal impressions,' i.e., a powerful mental shock or obsession of the pregnant woman, in causing malformation of the fetus has been held by many writers, but it is difficult to comprehend how such influences can affect the formation of the child in utero, especially in the later months of pregnancy.

Of the various classifications of monstrosities, the following is perhaps the best: 1. Malformations in which

certain parts of the normal body are entirely absent, or are too small. 2. Malformations produced by fusion or coalescence of organs. 3. Malformations in which parts naturally united, as in the mesial line of the body, are separated, and clefts or fissures occur. 4. Malformations in which natural openings are closed. 5. Malformations of excess, or in which certain parts have attained disproportional size. 6. Malformations in which one or more parts have an abnormal position. 7. Malformations of the generative organs.

The *first class* includes (1) completely shapeless malformations, in which the monster presents the appearance of a lump or mass, with no indication of definite organs; (2) malformations which consist of only a more or less rudimentary trunk, with no head or extremities; (3) trunkless monsters, in which the inferior parts of the body are lacking, and little more than a rudimentary head is present, which, instead of neck and trunk, is furnished with a pouch-like appendage, containing rudimentary viscera and pieces of bone; (4) malformations in which the head, and sometimes a portion of the upper part of the body, are wanting, constituting acephalic monsters, which are not very rare; (5) malformations in which the whole head is not absent, but some of its component parts are lacking; e.g., the brain, some of the cranial bones, the nose, or the eyes; (6) cases in which the extremities are absent or imperfect to greater or less degree—e.g., they may be mere stumps, with the fingers and toes either absent or rudimentary, or the hands and feet may appear to exist independently of arms and legs, and to be inserted immediately into the trunk; (7) cases in which all the organs may be present, but some of them may be too small—thus, there may be general dwarfishness, or the head or limbs may be abnormally small. None of the monsters of this class, except those included in the last two groups, are viable.—In the *second class* are included such cases as (1) the various forms of *cyclopia*, or coalescence of the eyes; these malformations are not very rare in the human subject, and are frequent in pigs and other animals; though usually born alive, these monsters are not viable; (2) coalescence of the lower extremities either into a common limb, which supports two feet, or into an undefined tail-like mass; (3) minor amalgamations, which do not affect vitality, as more or less perfect coalescence of the fingers and toes.—The *third class* embraces such cases as (1) fissures of the cranium, generally due to hydrocephalus in the fetus; (2) harelip and cleft palate; (3) fissures on the neck, whose origin is due to the respiratory clefts (which, during the formation of the embryo, appear in the cervical region) not uniting at an early stage, as in the normal condition, but remaining more or less open; (4) fissures of the vertebral arches of the spinal column, occasioning the affection known as *spina bifida;* (5) fissures of the

thorax, in which case the lungs or heart are more or less exposed; (6) fissures of the abdomen.—The malformations of the *fourth class* include congenital closure of the anus, the mouth, the nostrils, etc.—The malformations of the *fifth class* may be arranged in two divisions, according as certain parts are too large, or there are supernumerary organs. This class is very extensive, and embraces many varieties. One or more parts may be disproportionally large—e.g., the head in cases of congenital hydrocephalus; or there may be one or several supernumerary organs—a sub-class which presents a very great range, from the simplest cases, in which a single joint of a finger is supernumerary, to those of a highly complicated nature, when two or even three bodies are united by some one point. There may be a single head and trunk and supernumerary parts—as, for example, supernumerary teeth, vertebræ (giving rise to the formation of a tail in the human subject), ribs, mammæ, fingers, toes, etc.; or there may be malformations with more than one head and trunk—double, or even triplet monsters. This sub-class is divisible into two groups, according as the united individuals are equally developed, or as only one is developed; the second being more or less atrophied, and forming a parasitic appendage to the first. Examples of the first group, are (1) duplication of the head and upper part of the vertebral column; (2) duplication of the head, neck, and upper extremities, while the chest and abdomen are single, or fused into one another; (3) almost complete duplication, with separation of the two bodies, except at a single spot, as in the case of the Siamese twins; (4) triplet monsters. To the second group belong such cases as the following: (1) a perfect individual may bear on its head another head, with traces of the rest of the body; (2) on a well-developed body, a second, smaller and defective one, may be situated, which, after birth, does not increase in size; (3) in a more or less perfectly developed individual, there may be concealed, commonly in the abdomen, parts of a second individual—a condition which has received the name of *fetus in fetu*, and which is probably caused by the inclusion of one germ by another.—To the *sixth class* belong (1) those cases in which there is a reversing of the position of the internal organs—when the heart and spleen lie on the right, and the liver and cæcum on the left side; (2) anomalies in the course and distribution of individual vessels.—For malformations constituting the *seventh class*, see HERMAPHRODITISM.

The term *Teratology* [Greek *tĕras*, a prodigy, and *lŏgos*, a discourse] is now frequently applied to the history and science of monstrosities. Consult: Saint Hilaire *Histoire des anomalies de l'organisation* (Paris 1832-6); Hirse and Piersol, *Human Monstrosities* (Philadelphia 1891); Fitch, *Hermaphroditism*, in *New York Medical Journal* (1890, Nov. 22).

MONSTROS'ITY, in Botany: malformation or abnormal development of any part of a plant. It may take place, however, at any period of the growth of a plant, as to any new organ that is developed, and sometimes affects merely a particular organ or some portion of a plant, e.g., a particular leaf, flower, petal, sepal, etc., or the leaves or flowers of a particular branch, while in other cases all the organs of the same kind exhibit the same abnormal character. It is now well known that monstrosities in plants as in animals are the result of special conditions affecting the operation of ordinary natural laws; and the study of monstrosities is very important in relation to that of the nature, development, and metamorphosis of organs. For some of the most frequent monstrosities, see METAMORPHOSIS OF ORGANS. Monstrosities in plants are not always, as in animals, reckoned deformities. *Double flowers* afford a familiar example of an opposite kind; though in relation to the plant itself they have the effect of unfitting it for one of the functions of a perfect plant, reproduction by seed.

MONSTROSITY, MONSTROUS, etc.: see under MONSTER.

MONSTRUOSITY, n. *mŏn'strô-ŏs'ĭ-tĭ:* OE. for MONSTROSITY.

MONTAGNANA, *mŏn-tân-yâ'nâ:* town of n. Italy, province of Padua, situated pleasantly on the banks of a canal, Il Fiumicello, 32 m. s.w. of Padua. It is still protected by walls and towers, and has a fine cathedral and palace. Its chief trade is in spun-silk, wool, hemp, and coarse cotton textures. Pop. 7,657.

MONTAGNARDS, *mŏng-tân-yâr'*, or simply MONTAGNE, 'the Mountain': name given to the extreme democratic politicians in the first French Revolution, because they seated themselves on the higher benches of the hall in which the *National Convention* met, 1789-91. Their principal members were Danton, Marat, Robespierre, St. Just, and Collot d'Herbois, the men who introduced 'the Reign of Terror.' The opposite party of the 'Plain' (*Plaine*) were the Girondists (q.v.), who sat on the lowest benches on the floor of the house. After the overthrow of the Girondists, this part of the house was styled the 'marsh or swamp' (*marais*), and included all the subservient members whose votes were under the control of 'the Mountain.' A few leading men gave all its strength and formidable character to the party of the Mountain.—After 1848, the extreme party in the *National Assembly*, composed of revolutionary democrats and communists, sometimes flattered itself with the designation of 'the Mountain;' but events proved that it possessed nothing of the genius, though it showed all the malignity of its terrible predecessor.

MONTAGU, CHARLES: see HALIFAX, EARL OF.

MONTAGU, *mŏn'ta-gū*, FAMILY OF: family in the English nobility, said, by Durke, to derive their name (which in Latin was and is always written De Monte Acuto) from a place in Normandy. The first of the M. who settled in England was a warrior who came over in the train of Robert Earl of Moreton at the Conquest 1066.—Five centuries later, his descendant, Sir Edward Montagu, was lord chief justice, in succession, of the courts of king's bench and common pleas under Henry VIII., who also appointed him one of the executors of his will and guardians of his son Edward.—His grandson, a distinguished orator, represented the city of London in parliament; and having been lord chief justice of the court of king's bench, and lord treasurer of the kingdom, was raised to the peerage as Earl of Manchester.—The second earl gained distinction as a gen. in the parliamentary army, and particularly by his victory over Prince Rupert at Marston Moor; but he scrupled to take part in the condemnation and beheading of Charles I., and was one of the first members of the house of peers who gave in his adhesion to Charles II. on his restoration.—This nobleman's grandson enthusiastically espoused the cause of William III., under whom he fought at the battle of the Boyne, and took part in the siege of Limerick. He was subsequently sent as ambassador to Venice, and to the courts of France and Vienna, and eventually was raised to the dukedom of Manchester by George I.—The title is held by his descendant, the 7th duke.—Other branches of the M. family were ennobled in the persons of the Earl of Sandwich, the Earl of Halifax, and the Duke of Montagu, but the last two titles both became extinct before the close of the 18th century.

MON'TAGU, Lady MARY WORTLEY: 1690–1762, Aug. 21; b. Thoresby, Nottinghamshire, England; daughter of Evelyn Pierrepont, Earl, afterward (1715) Duke of Kingston, and of Lady Mary Fielding, daughter of the Earl of Denbigh. She is said to have received a classical education. When only eight years of age, she was introduced by her father to the famous *Kit-Cat Club*, and formally admitted a member. Her fond and pleasure-loving father allowed her to educate herself. She is even said to have taught herself Latin. She became attached to Edward Wortley Montagu, member of the house of commons, whose cousin, Charles Montagu, was created Earl of Halifax and appointed first lord of the treasury by George I. As the match was disapproved by the families, she eloped and married him. On the accession of George I., she came to London with her husband, who was a whig. Lady Mary's beauty and wit attracted universal admiration at court. She was on terms of familiar acquaintance with Addison and Pope, the latter becoming her enthusiastic admirer, and writing 'flames and raptures' for her, until his passion 'came to a climax in an impertinence, and was extinguished by a box on the ear, or some such rebuff.'

In 1716, Wortley Montagu was appointed ambassador to Constantinople. He was accompanied by Lady Mary, who, on her journey, and during her residence in the Levant, wrote the well-known *Letters*, which form one of the most delightful books in our language. The weaknesses of a somewhat vain and capricious temper fade into forgetfulness, when we remember the strong sense, enlightened courage, and generous perseverance which introduced into Europe the practice of inoculation (q.v.), which she witnessed in Turkey. She had so much faith in its safety, that she tried it first on her own son. After her return to England, she fixed her residence at Twickenham, and renewed her intimacy with Pope. But political soon led to personal differences, and these resulted in one of the most famous literary feuds of the 18th c. The immediate occasion of it was the publication by Lady Mary of her *Town Eclogues*. She was fiercely assailed by both Swift and Pope, and was not slow to retaliate. In 1737 she left her country and her husband (for reasons not known), and lived many years in Italy, chiefly at Lovero, in the province of Venice. Her husband died 1761. At the request of her daughter, afterward wife of the Earl of Bute, she returned to England, where she died. She was brilliant, eccentric, unconventional, always liable to be misunderstood; but her letters show her to have had a warm heart. A collected ed. of her works, with life, was published by her great-grandson, the late Lord Wharncliffe, 1836, of which a third ed. (the best) appeared 1861, with memoir by Moy Thomas.

MONTAIGNE, *mŏn-tān′*, F. *mōng-tāñ′*, MICHEL EYQUEM DE: distinguished French moral philosopher: 1533, Feb. 28—1592, Sep. 11; b. at his paternal home of Montaigne, in Perigord. In accordance with his father's eccentric ideas on education, he was taught and allowed to speak only Latin from his earliest infancy, in consequence of which he acquired such mastery of the language, that when, in his seventh year, he entered the college of Bordeaux, with its 2,000 scholars, his masters, Guérente, Buchanan, and Muret, were almost afraid to address him. On the expiration of his studies, which were directed to law, he received 1554 the appointment of councilor in the parliament of Bordeaux; but being possessed of ample means, and having no inclination for a public life, he applied himself to the study of the various schools of Greek and Roman philosophy; and on the death of his father, in compliance with whose wish he had made a translation of the nat. theology of Raymundus Sebondus (Paris 1569), he retired to his ancestral estate, where he lived in retirement during the terrible season of religious oppression which desolated France for many years. During this period, 1580, he composed the first two books of his celebrated *Essais*, the third portion of which appeared 1588, after his return from extensive travels. M.'s *Essais*, though not conceived in the spirit of a believing Christian, or marked by the reticence and

delicacy of expression which modern refinement demands, are very extraordinary productions, not only for their learning and sound reasoning, but also for the frank and liberal tone in which social questions are discussed, notwithstanding that the author wrote at a period when religious differences and party feelings blinded the judgments of men. M.'s ethics were those of Seneca and the other philosophers of ancient times, whose works he had thoroughly mastered; and, judged from our point of view, his morality is that of a virtuous pagan merely; but when we bear in mind the turmoil of civil war, and the consequent disorganization of society, together with the low ebb of literature in France at that period, we must do justice to the great merit of the writer, and the influences for good which his writings exerted. His writings give charm rather than inspiration; the style is flexible and easy; and though method is almost lacking, M. deals in deft touches of genial humor with almost all of human life. It was part of his humor to assume an attitude of pessimism; but the real spirit of his work and its actual influence will be found more in accord with deep truth than his mere expressions at first suggest. M. was a constant, and occasionally a successful, mediator between the party of Henry of Navarre and that of the Guises, and stood in relations of friendship with men of all creeds. He died as an avowed member of the Church of Rome, in whose doctrines he professed implicit faith, notwithstanding the skeptical bias which he had through life been at no pains to conceal. Numerous editions have appeared of his *Essais*, among which are those of Le Clerc (Paris 1826), and MM. Courbet and Royer (Paris 1873–77). Nearly 200 years after his death, the discovery was made at Montaigne of the MS. of his travels, published at Paris 1774, under the title of *Journal de Voyage de M. de M. en Italie par la Suisse et l'Allemagne.* Translations of the *Essais* exist in almost all the European languages; the best English translation is that by Cotton. The best biographies of M. are by Grün (Paris 1855); Payen (Paris 1856); and Bayle St. John (Lond. 1857).

MONTAJONE, *mōn-tâ-yō'nā:* town in n. Italy, about 25 m. s.w. of Florence. It is not far from the coast, and has famous medicinal springs. Pop. 10,553.

MONTALCINO, *mōn-tâl-chē'nō:* town in the province of Siena, central Italy, 22 m. s.s.e. of the town of Siena; on a hill in the midst of valleys. It has a fine equable climate. The wine of M. is in great repute throughout Tuscany. Pop. 7,540.

MONTALEMBERT, *mōng-tȧ-lŏng-bär′*, CHARLES FORBES, Comte DE: 1810, May 29—1870, Mar. 13; b. London; of an ancient family of Poitou. His father was created a peer of France 1819 under the Restoration, and for a considerable time was minister of the French court in Sweden. His mother was of the Scottish family of Forbes, which fact accounts for M.'s remarkable familiarity with the English language, and his intimate knowledge and strong admiration of the social and political institutions of England. Although his more advanced studies were carried on in the University of Paris, a considerable part of his youth was spent in Sweden; and the first work by which he was brought into notice was a pamphlet on Sweden, published in his 19th year. On the death of his father, M. succeeded to his honors, and later to his seat in the chamber of peers. But his earliest public appearance was in what may be truly considered the great labor of his life, a joint effort in which he associated himself with the Abbé Lacordaire (q.v.) and other friends, for the purpose of taking advantage of the recent charter, by establishing a free school for Liberal Catholic education, independent, as well of the university, as of all other state influence. An attempt by the police to interfere arbitrarily with this project, became the subject of a trial before the chamber of peers, which M. rendered memorable by his first speech, one of the most brilliant on record, and a clear foreshadowing, not alone of the eloquence, but of the bold and uncompromising earnestness in the cause of his church and of the common interests of religious liberty, which constantly characterized his later career. Of the struggle of the Liberal Catholic party in France against what they regarded as the arbitrary monopoly of education which was claimed for the university, M. was for many years the leader and the champion; and he never ceased to advocate the same principles in the various works in the preparation of which he employed his leisure from public duties—*Life of St. Elizabeth of Hungary*, *Life and Times of St. Anselm*, and, above all, an appeal *On the Duty of Catholics on the Question of Freedom of Education*, which he wrote during a visit to the island of Madeira for his health 1843. After the revolution of 1848, M., true to his former professions, was one of the first of his party to accept the new state of things, and to use the actual means at his disposal for the furtherance of the views which he had consistently advocated. He was elected member of the national, and afterward of the legislative assembly; and for a time contrived, while he continued the same line of policy as regards church interests, to give a general support to the govt. of Louis Napoleon as pres. of the republic. His first break with that govt. was on the question of the proposed confiscation of the Orléans property; and after the *coup d'état* of December, the breach became irreconcilable. From that time M. continued the implacable assailant of the arbitrary repression of public opinion

which characterized some measures of Napoleon III.; and the brilliant and enthusiastically admiring pictures which, in his *Political Future of England*, he has drawn of its social and political institutions, derive much of their vigor from their covert but palpable contrast with the condition of France. M. had strong religious sentiment, and was gifted with an almost too fluent eloquence. Besides numerous articles contributed by him to the *Revue des Deux-Mondes*, the *Encyclopédie Catholique*, and the *Correspondant*, he wrote: *L'Avenir politique de l'Angleterre* (1855); *Les Moines d'Occident depuis St. Bénoît jusqu'à St. Bernard* (1860–67; his chief work; English translation, 7 vols. 1861–79); *Une Nation en deuil, la Pologne en* 1861; *L'Eglise libre dans l'Etat libre* (1863); *Le Pape et la Pologne* (1864), etc. See Memoir by Mrs. Oliphant, 2 vols. (1872).

MONTALIVET, *mōng-tā-le-vā'*, MURTHE CAMILLE BACHASSON, Count DE: 1801, Apr. 25—1880, Jan. 4; b. Valence, France: statesman. He was educated in the Polytechnic School in Paris; took his seat in the chamber of peers 1826; was appointed minister of the interior 1830, Nov., minister of public instruction 1831, Mar., and again minister of the interior 1837, Apr.; and was elected a senator 1879. He was a strong constitutional monarchist; supported the Orléans family; opposed Guizot and the *doctrinaires;* and gave his adhesion to the republic 1872, as presenting the only form of free govt. then possible for France. He published, in defense of the Orléans family, *Le Roi Louis-Philippe et la liste civile* (1851), and *Dix années de gouvernement parlementaire* (1862).

MONTALVAN, *mon-tâl-vân'*, JUAN PEREZ DE: 1602–1638, June; b. Madrid: dramatist. He was a son of the royal bookseller; became a licentiate in theol. in 1619; began writing for the theatre under the direction of Lope de Vega about the same time; was ordained a priest 1625; and by 1632 had written 36 dramas and 12 *autos sacramentales.* The pressure of dramatic writing made him insane shortly before his death. Besides the above dramas he left about 60 plays, and *Orfeo*, poem (1624), *Life and Purgatory of St. Patrick* (1627), *Para todos*, stories (1632), and a tribute to his friend Lope de Vega (1636).

MONTANA, *mŏn-tâ'na:* state; one of the United States of America; 28th in order of admission to the Union, and thus the 41st state.

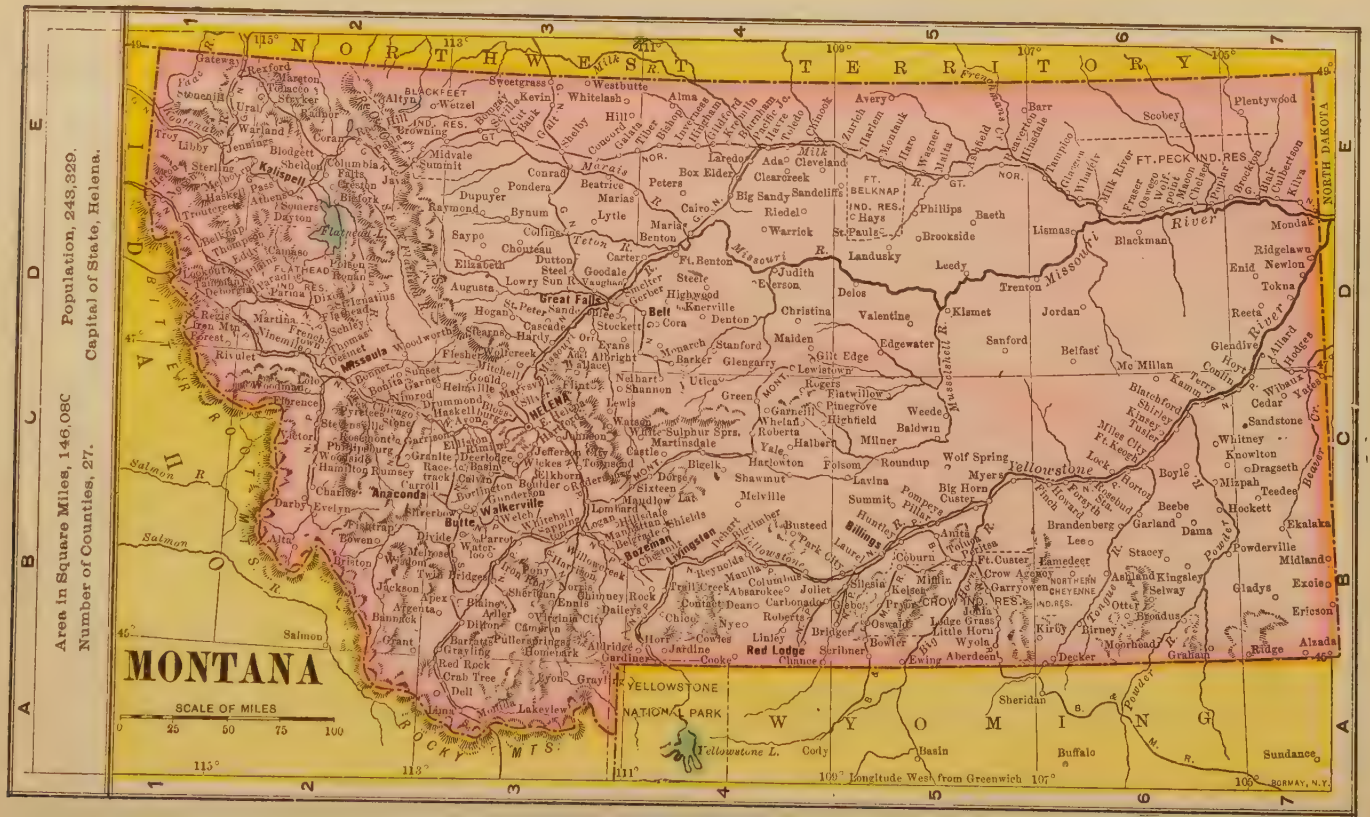
Location and Area.—M. is one of the extreme n.w. states; lat. 44° 15′—49° n., long. 104°—116° w.; length on n. border 540 m., along 45th parallel 460 m.; average breadth n. and s. 275 m.; 146,080 sq. m. It is bounded n. by the Dominion of Canada, w. and s.w. by Idaho, s. by Wyoming, e. by S. Dak. and N. Dak.; average elevation above sea-level about 3,900 ft.

Topography.—M. has two great natural divisions, according to the general character of the country: 1. The western third, the character of which is made by the mountains, which form the crest of the continent and have given M. the name of 'the mountain state;' and 2, the eastern two-thirds, a vast expanse of plateaus, rolling prairies, and level plain, especially in the n.e. The mountain region consists of a succession of ranges and valleys running generally n.w. and s.e. Besides the main range of the Rocky Mts., which enters the w. part of M. from the n. and extends 200 m. s.e., and there bends in the direction of the w. boundary, there are the Bitter Root, which the main range meets at the w. boundary, the Deer Lodge, Bear Paw, Big Horn, Powder River, and Gallatin ranges; the little Rockies, the Belt range s. of the Great Falls of the Missouri, the Highwood in the n., the low-lying Spoonbill, and many detached spurs and sloping buttes. The chief mountain region extends entirely across the w. end of the state, from n. to s., with a width of 175 m. The general elevation is much greater in the s. than in the n. Between the ranges are deep divides; rivers wind round the spurs; and cañons separate the buttes. In the s. part, near the Yellowstone river, the mountains rise 11,000 ft. above sea-level, covered with perpetual snow, and in the n., beyond the Missouri, the mountain-tops in early autumn are seen for many miles across the treeless plains, mingling the snowy purity of their tops with the blue of the sky. Toward the n. the ranges are so nearly continuous as to force the streams into long circuits, but in the s.w. the ranges are more broken, and afford numerous low passes and water-gaps. The chief peaks in M. are: Emigrant Peak 10,629 ft.; Mt. Powell 10,500; Ward's Peak 10,371; Mt. Cowan 10,351; Mt. Washburn 10,134; and Mt. Delano 10,200. Away from the region of mountains are found solitary peaks of basalt, tuff, and other volcanic rock, which appear of rocky solidity and hardness, but are in fact frequently soft enough to be cut with a knife. The scenery among the Rocky Mountains of M. is scarcely surpassed in the world. There are no wonders greater than those found in the region drained by the head-waters of the Missouri river. One of these is the Fire Hole basin, in the valley of the Madison, containing many hundreds of boiling springs and spouting geysers, which far exceed those of Iceland in size and grandeur. The Grand Geyser, the most magnificent in the world, throws a stream of hot water to the height

of 300 ft. The cañon of the Yellowstone is a great rent in the mountain range, with perpendicular basaltic walls 1,000 to 2,000 ft. high. For 25 m. along this chasm the river rushes with fearful velocity, making in one place a fall of 300 ft., one of the grandest cataracts on the globe. Out of this mountain region, partly in M. and partly in the n.w. corner of Wyoming, has been formed an immense 'National Park,' two-thirds the size of Connecticut, within the limits of which are not less than 10,000 geysers and boiling springs, many grand waterfalls, beautiful lakes, deep cañons, and mountain peaks.

The eastern two-thirds of M. is a generally monotonous expanse, broken only by the beds of the few streams which traverse it, and by a few small groups of hills. It extends through nine degrees of latitude in a gently uniform upward slope from e. to w., rising from 2,000 ft. above the sea at the e. boundary to 4,000 at the base of the Rocky Mountains. Except along the streams and upon the scattered groups of hills, no forest growth of any kind is found, and vegetation is limited to the bunch grasses, very valuable for grazing, and to artemisia and cacti. The grasses are most abundant and luxuriant near the mountains, where the rainfall is greatest.

In the mountain region of M. are the head-waters of the Missouri (Atlantic basin), and Clarke's fork of the Columbia (Pacific basin). The Missouri has three head-streams, the Jefferson, Madison, and Gallatin, which meet at the foot of the Gallatin valley, at a point known as 'the three forks of the Missouri.' From this point to its mouth, navigation is possible when the stream is not below its mean height, with the interruption made by the Great Falls between Helena and Fort Benton. From Fort Benton down, steam-boat navigation is good from April to September, and with improvements in the channel may be extended to the Great Falls. The other chief streams falling into the Missouri in M. are, on the n., the Sun, as high up as Great Falls, the Teton, just below Fort Benton, the Marias, not much lower down, but a stream of several branches, the Milk, a still greater stream with a long course in the n. middle part of the state, and the Poplar and Big Muddy, in the n.e. corner; and on the s. side of the Missouri such small streams as the Arrow and Judith, and one considerable river, the Musselshell, which drains a large area in the centre of the state and flows n. into the Missouri. The great Yellowstone river rises in the extreme s.w. part of M., and flows e. and n.e. to the Missouri, just over the boundary in N. Dak. It is navigable early in the season, and even as late as August, 300 m. above its mouth, and has tributaries on the s., the Big Horn, the Rosebud—where Custer's last battle with Sitting Bull took place—the Tongue, and the Powder. The Clarke's fork of the Columbia is formed by the union of the Flathead and Missoula rivers. The Missoula (treated sometimes as the lower reach of the Bitter Root) is formed from the Bitter


MONTANA
Area in Square Miles, 146,080
Population, 243,329.
Number of Counties, 27.
Capital of State, Helena.
NORTHWEST TERRITORY
NORTH DAKOTA
WYOMING
YELLOWSTONE NATIONAL PARK
Yellowstone L.
Great Falls
Belt
Missoula
HELENA
Anaconda
Butte
Walkerville
Bozeman
Livingston
Billings
Red Lodge
Kalispell
Flathead L.
Salmon R.
Yellowstone R.
Missouri R.
Milk R.
Musselshell R.
Powder R.
Big Horn R.
Tongue R.
Marias R.
Teton R.
Sun R.
Smith R.
Judith R.
Musselshell R.
Milk River
Frazer
Poplar
Big Sandy
Cut Bank
Sweetgrass
Kevin
Whitelash
Westbutte
Alma
Avery
Barr
Scobey
Plentywood
Mondak
Ridgelawn
Enid
Newlon
Tokna
Reeds
Glendive
Allard
Hodges
Cedar
Sandstone
Whitney
Knowlton
Dragseth
Mizpah
Teedee
Hockett
Ekalaka
Powderville
Midland
Exeie
Ericson
Alzada
Ridge
Gladys
Kingsley
Selway
Boyle
Beebe
Garland
Dama
Brandenberg
Lee
Stacey
Ashland
Otter
Broadus
Birney
Moorhead
Grafton
Decker
Kirby
Ewing
Aberdeen
Wyola
Little Horn
Lodge Grass
Crow Agency
Garryowen
Famedeer
Ft. Custer
Coburn
Pryor
Joliet
Silesia
Molt
Melstone
Musselshell
Roundup
Lavina
Shawmut
Melville
Harlowton
Folsom
Milner
Weede
Baldwin
Flatwillow
Pinegrove
Highfield
Rogers
Lewistown
Gilt Edge
Maiden
Christina
Valentine
Edgewater
Kismet
Sanford
Belfast
Mc Millan
Jordan
Trenton
Leedy
Brookside
Baeth
Phillips
Landusky
Delos
Everson
Judith
Ft. Benton
Steele
Highwood
Knerville
Denton
Stockett
Cora
Monarch
Stanford
Glengarry
Barker
Utica
Green
Garrett
Whelan
Roberta
Yale
Halbert
Nelhart
Shannon
Lewis
Watson
White Sulphur Sprs.
Martinsdale
Bickle
Dorsey
Sixteen
Maudlow
Melville
Lat
Lombard
Hillsdale
Manhattan
Belgrade
Shields
Busteed
Park City
Laurel
Reynolds
Manlius
Columbus
Absarokee
Joliet
Carbondale
Roberts
Bridger
Fishtail
Rock Creek
Contact
Dean
Chico
Nyo
Cowles
Linley
Jardine
Cooke
Clinton
Scribner
Bowler
Oswald
Ft. Peck Ind. Res.
Blackfeet Ind. Res.
Fort Belknap Ind. Res.
Crow Ind. Res.
Northern Cheyenne Ind. Res.
Longitude West from Greenwich
Sheridan
Basin
Buffalo
Cody
Sundance
Bormay, N.Y.
SCALE OF MILES
0 25 50 75 100

Root, Blackfoot, and some smaller streams, which gather the waters of the s.w. part of M. between the main divide of the Rocky Mountains and the Bitter Root range. It flows n.w., receiving on its course the Flathead, which comes from the n. through Flathead Lake, on the w. of the main range of the Rocky Mountains. Except Flathead and some small lakes in the s.w. part of the state, M. has no lakes. Flathead, 30 m. long and 14 wide, lies in the upper w. part of M., the country of the Flathead and Bannack Indians. It has dense forests of heavy timber, pine, tamarack, and fir, growing to the edge of the water, except on the n., which is open grassy prairie, with much tillable land. Timber is most abundant in the n.w. The trees most found throughout the state are pine, spruce, fir, cedar, and balsam; cottonwood, poplar, and willow. In sheltered glens among the mountains are found spots green with pine, cedar, and fir trees, and having a soil susceptible of high cultivation. Groves of cottonwood, ash, and hickory grow on the banks of the Missouri, and thickets of willows, in which the 'diamond willow' is found, are common. Grass, and wild flowers of rare beauty, abound in the valleys. Bunch grass covers all the plains and hillsides, giving rich grazing, not only in summer, but also through the open winters.

The valley lying n. and s. of Fort Owen, 80 m. long, 5 to 10 m. wide, and having an elevation above sea-level of 3,284 ft., has a soil of rich black loam, in which the cottonwood grows to the height of 70 ft., and pines to 150 ft. The Missoula valley, 15 m. wide for a length of 30 m., has a moderate climate and is well wooded. Prickly Pear valley, near Helena, is 5 to 15 m. wide and 20 m. long, with beautiful smooth meadows. The valley of the Teton, near Fort Benton, 2 to 6 m. wide, has bordering table-lands 75 ft. above it. Deer Lodge valley, at an elevation of 5,000 ft., is 40 m. long and about 12 m. wide, with a central stream its whole length, and mountain rivulets falling into it on either side. Sun River valley, with its swift stream, and timber of cottonwood and ash, is one to three m. wide, and for 25 m. beyond the crossing of the road from Helena to Fort Benton is 5 m. wide. The basin through which the Judith river flows is 50 m. wide and 80 m. long, and besides the main stream there are the w. and s. forks and Big Spring creek. In the area between these valleys are extensive cattle ranges, taken up by residents of the towns, and visited semi-annually.

Climate.—The isothermal line of Philadelphia is found at St. Paul, Minn., the Red River valley in Dak., and through M., giving this state a notable climate, in its effect on health, agriculture, commerce, and business interests, such as the grazing of cattle. The atmosphere is peculiarly dry, and is exceptionally invigorating and health-giving. It perfectly matures the wild grasses, and leaves them as ripe and sound as the best hay for the winter grazing of sheep and cattle, so that herding

reaches the perfection of ease and cheapness. The annual mean temperature ranges from 44° to 48°. Sudden and extreme changes are frequent; in every month of the year frosts and snow-storms are possible. A November sun sometimes shines with as much intensity as in July, and the traveller may set out for a journey of 150 m. in a linen coat and require a fur coat before he comes to his destination. The length of the summer days, the total amount of sunlight for a season, and the delicious life-giving winds far more than make up for the fierce storms, the winds laden with dry snow and sand which make the deadly blizzard, and the very infrequent continuance of heavy snow covering the ground. A peculiar wind, the 'chinook,' which has come over the Pacific from China and Japan—a strong and warm wind—leaves its moisture as it passes over the cold forest-clad mountains, and flows over M., into the Dakotas, with a dryness which in winter vaporizes and absorbs the snows, and a purity at all times singularly health-giving. Before the terrible cold and snow blockade for weeks together of 1881, the wild bunch, buffalo, and gama grasses were found ample food for stock throughout the year. Hay is made on the river bottom-lands and carried into the interior, but except at forts, little is needed. The winter of 1886–7 was one of very exceptional cold and snow, following a summer in which drought greatly injured the grass-crop; and the result to the stock-grazing interest was a loss of cattle estimated at $25,000,000. In ordinary years the snows of winter do not, by thawing and freezing, become a solid mass covering the ground, but are very much blown from the ranges, or taken up by the dry air, leaving the ripe grass exposed for the cattle to feed upon.

The rainfall over most of the state does not vary much from the average at Fort Benton, 12·17 in. annually. In the n.w. region, the drainage area of the Clarke's fork, it is twice as much, giving enough for forests and for agriculture. From the mountain valley about the heads of the Missouri, across all the plains of the central and e. parts of the state, there is in general an insufficiency of rain, and trees are lacking.

Geology.—Azoic formations prevail in the w.; and eastward there appear first the Jurassic, next the carboniferous, and near the Dakota line the tertiary. Along the base of the mountains are beds of Jurassic and carboniferous rocks. Potsdam sandstone and brick-making clay are abundant, and some granite is found. Slate is found in large quantities in the placer-mining districts. In all sections the strata are much broken, and present a great variety of formations.

The plains which at the mouth of the Yellowstone are 2,010 ft. above sea-level rise gradually to 4,091 ft. at the base of the mountains, the elevation of the valleys varying from 3,000 to 5,000 ft. The cretaceous strata in the n. yield coal of the best quality, which is mined in the vicinity of Bannack, Helena, Virginia City, Deer Lodge, and Fort Benton; and there are evidences of its presence

on the Missouri, Musselshell, and Yellowstone. Petrifactions of all kinds—e.g., of snails, snakes, sea-serpents, buffaloes' bones, etc.—are found near the Missouri.

Mines and Mining.—Montana has been known principally on account of her mines, and leads in the production of copper and in the output of sapphires. The early history of the state is the search for gold, and many of her towns and cities are built in gulches where placer gold was mined. Virginia City and Helena are illustrations, the former being the oldest camp in the state. Although Butte is the greatest mining camp in the state, and indeed the greatest in the world, it is by no means the only place where mining is carried on. In 1900, mining for gold and silver was carried on in the following counties: Beaverhead, Broadwater, Cascade, Choteau, Custer, Deer Lodge, Fergus, Flathead, Granite, Jefferson, Lewis and Clarke, Madison, Meagher, Missoula, Park, Ravalli and Silver Bow. Lewis and Clarke was the greatest producer. In 1904 there were 216,189 fine ounces of gold and 11,980,705 fine ounces of silver produced in the state. During the 40 years following the discovery of gold in the state over $1,000,000,000 in value of gold, silver, copper and lead have been taken from the streams and mountains of the state. While Butte is the great mining camp for copper, it is also mined in the counties of Beaverhead, Granite, Jefferson, Lewis and Clarke, Madison and Meagher. Lead was produced in all the counties mentioned except Madison, and in addition also in Broadwater, Cascade and Flathead. The total lead output is nearly 16,000,000 pounds. Montana is one of the richest coal states in the West, although much of it is undeveloped. Over 1,780,000 tons were mined in 1906 and new mines are being opened annually. The cretaceous, bituminous and semi-bituminous coal areas in the state cover about 13,000 sq.m., and the lignite area about 25,000. Not all of this territory contains coal, of course, but the deposits are found quite abundantly throughout the territory. The tests show the bituminous coal to be but little inferior to Pennsylvania bituminous coals. Bituminous coal or lignite has been found in every county of the state except Jefferson. The undeveloped coal industry will without doubt be a prominent factor in the future expansion of other industries of the state. In addition to its coal, the state has extensive beds of clay; the brick and clay product amount to $500,000. The output of building stone was about the same. Montana leads the Union in the production of sapphires, the actual mining of which began in 1891. Four mining regions may be mentioned: A belt 12 m. n.e. of Helena on the Missouri river; the Rock creek region, 30 m. w. of Anaconda; the Cottonwood creek field, 10 m. e. of Deer Lodge, and the Yogo mines in Fergus co., 13 m. w. of Utica. The annual output of sapphires in the state is between 450,000 and 500,000 karats, including those suitable for

cutting and those used for mechanical purposes. A lapidary at Helena employed 15 men, and it is asserted that finer work was done there than on stones sent to London.

Zoology.—The wild animals of Montana have been numerous and of great variety, but are disappearing as the country is settled. Great herds of deer, elk, mountain-sheep, antelope, were found in the mountains and on the foothills and plains of the mountain regions. The moose was frequently seen in the mountain gorges. Buffaloes, now no longer to be found, have been abundant at all points on the Missouri. Deer and antelope visit the rivers in the morning. Wolves are often seen on the prairies; grizzly bears, black bears, mountain lions, lynxes, and wild cats are plentiful in the forests; badgers, minks, otters, martens, and beavers are found; and in the streams trout, whitefish, and salmon.

Agriculture.—The state as a whole is not as available for agriculture as for mining and grazing; yet its many valleys are easy of irrigation and are remarkably fertile, yielding large returns in wheat, oats, barley, and all kinds of vegetables and fruits. Circumstances peculiar to the climate have in some seasons caused the failure of crops; but in the western part of the state the valleys of the Prickly Pear, Gallatin, and Bitter Root rivers, and in the north the valleys of the Teton and Sun rivers, are unsurpassed for agricultural advantages. In the Bitter Root valley, called the Garden Valley of Montana, apples, plums, and potatoes of rare size and quality are raised, and small-fruits thrive everywhere, giving an enormous yield. Stock-raising comes next to mining as an industry, on account of the vast extent of land peculiarly adapted to grazing rather than tillage. Within recent years there has been an immense investment in stock brought into Montana, as well as shipment of stock to the great markets of the United States. The losses of stock 1886-7 gave a new impulse to regular farming. The yield in the summer following of the chief crops was as high as 80 bushels per acre of oats, 65 wheat, 40 corn, and 200 to 300 potatoes; with an abundaut crop of small-fruits. Wheat and oats are the cereals best suited to the climate and soil. Both the bench or upper and the bottom lands of the eastern part of the state are equally susceptible to cultivation, subject to conditions of season and locality, and productive of wheat and all the more hardy vegetables. Irrigation is conceded to be of urgent and universal importance, and with the sunshine and air of Montana a sure means of making the state the garden of the continent. In 1900 Montana had 13,370 farms, comprising 11,844,454 acres, of which 1,736,701 were improved and 10,107,753 unimproved; and the property, including buildings, implements, and machinery and live stock was valued at $117,859,823. In 1906 the principal crops were corn, 93,132 bushels, valued at $60,536; wheat,

3,297,336 bushels, valued at $2,110,295; oats, 8,501,846 bushels, valued at $3,740,812; barley, 472,329 bushels, valued at $264,504; rye, 41,430 bushels, valued at $27,-344; potatoes, 2,143,048 bushels, valued at $1,307,259; hay, 691,580 tons, valued at $6,155,062; and flaxseed, 298,260 tons, valued at $298,260. In 1907 the live stock was as follows: Horses, 291,970, valued at $18,379,534; mules, 3,917, valued at $314,939; milch cows, 65,948, valued at $2,308,180; other cattle, 916,350, valued at $18,-134,570; sheep, 5,636,711 (Montana leading all other states), valued at $20,833,283 (the product being 35,815,-000 pounds of washed and unwashed wool and 12,535,250 of scoured wool, valued at $8,523,970); and 62,891 swine, valued at $578,597.

Manufactures.—The predominating industry is the smelting of ores. The largest smelter in the world, the Washoe, is located at Anaconda. For the treatment of ores, water is brought from a lake some 15 m. away in the mountains. The smelters of Butte have long been known. At Helena a large smelter is in operation, and another at Great Falls, where water power from the Missouri river is used. Many flouring mills have been established, utilizing almost the entire crop of wheat in the state, and consuming large quantities from the Dakotas. The large lumber mills at Bonner, Hamilton, Somers and other places have extensive factories in connection with the saw mills. They manufacture doors, sash, blinds, and other finishing stuffs. They also make large quantities of furniture from native lumber. A woolen mill, in operation in Big Timber, established in 1901, consumes a considerable amount of wool product. Although Montana leads all other states in the number of sheep, the loss from the two items of freight eastward and the difference in the value of the wool in the grease and the scoured product will annihilate the value of all the flocks on the range of the state in ten and a half years, if the wool is all shipped to the east. To treat it in the state will save $1,000,000 annually to the state. Nearly every large town has a factory for malt liquors. Creameries and butter factories are springing up. The transcontinental railways have several repair shops and round houses in the state. A biscuit and cracker factory is located at Helena and does a large business. In 1905 there were 382 manufacturing establishments capitalized at $52,589,810; the average number of wage earners was 8,957, and their wages amounted to $8,652,217; the cost of materials used was $40,930,060; and the value of the products was $66,415,452. Lumber and timber products ranked first among the manufactures, the product being valued at $3,024,674; next in order were flour and grist mill products, $2,003,136; malt liquors, $1,731,691; and cars and general shop construction, $1,572,478.

Commerce.—The chief shipments are of cattle, hides, pelts, furs, wool, and the products of the mines, the first

and the last of a bulk and weight demanding very large railroad facilities. The shipments into Montana of choice cattle from Ohio, Illinois, Iowa, and other cattle-raising states have been very large, for the stocking of thousands of ranches, but especially those owned by 10 or 12 great companies. The amount of merchandise of all kinds carried into Montana to meet the wants of a peculiar community, has been very large. It was at first by way of the Columbia and the Missouri rivers, and the hardest possible teaming over mountain roads; but railway facilities are now added, providing for a large volume of trade.

Railroads.—The total mileage of railroads in 1905 was 3,328.42 m. During that year and the year preceding 199.5 m. of road were constructed, not including large expenditures for betterment of track on existing road. Two transcontinental lines cross the state. In the north is the Great Northern, with its many branch lines. Toward the southern part is the Northern Pacific, also with numerous short branches as feeders. The Burlington connects with the latter at Billings, running through trains over the Northern Pacific tracks to the coast. The Northern Pacific operates three daily passenger trains each way over most of the state—as far east as Billings, where one takes the Burlington route for Denver, Omaha and St. Louis. The Great Northern operates two daily passenger trains each way over its road. The Oregon Short Line connects at Butte, making a gateway to Salt Lake and the south, east and west. From one end of the state to the other on the Northern Pacific requires about 24 hours of travel, following for considerable distances the Missoula, Missouri, Gallatin and Yellowstone rivers, with their varied scenery. The Great Northern skirts the banks of the Kootenai, the Flathead, the Milk, and the Missouri rivers, and gives a view of the great unoccupied field along the two latter.

Religion.—As early as 1880 almost every settlement had a religious society, every village a newspaper, and nearly every town two or more churches. Missionaries made great efforts to establish schools at the Indian agencies, and Roman Catholic, Methodist Episcopal, Congregational and Protestant Episcopal ministers were self-sacrificing and devoted in efforts to plant social and religious order. With the rapid planting of new towns, churches are multiplying, and nearly all denominational bodies are represented by congregations.

Education.—In 1906 there were 65,341 children of school age, the number enrolled was 44,881 and the average daily attendance was 31,471. There were 216 male teachers and 1,052 female teachers, whose salaries, together with those of superintendents, amounted to $651,738; and the total expenditures amounted to $1,236,253. There were 25 public high schools; 6 private secondary schools; 1 public normal school; 1 university; and 2

schools of technology. Although young among the states, Montana ranks high in the efficiency of her educational system, the illiteracy of native born population being less than 4 per cent. Salaries of teachers are the highest of any state in the Union. More than 25 cents per day is spent upon each child in school. There are school lands amounting to 2,341,000 acres, and land grants to state institutions aggregating 668,080 acres. The state has a system of county high schools, under a separate board of trustees and with separate administration from city schools. These schools are maintained by county assessment, and are free to pupils in the county. The law was passed in 1898, and has borne fruit beyond the expectations of the promoters of the law. More than half of the counties in the state have county high schools. For these schools, expensive and lasting buildings are constructed, which are being erected rapidly. This system gives to the counties in which the schools are located a number of specialists as teachers, which must result in great good to the educational system. The State Normal School, at Dillon, has about 100 in attendance, although organized but a few years. The land grant, 100,000 acres, is selected, yielding an annual income of over $5,000, which is constantly increasing. The State Agricultural College and experiment station at Bozeman, opened in 1893, has about 350 students. The land grant is 140,000 acres. The State School of Mines, opened in 1900, is at Butte, with about 70 students; land grant 100,000 acres. The State University (1895), at Missoula, has about 225 students; land grant 46,080 acres. The university established a summer school for science at the upper end of Flathead lake in 1899, known as the University of Montana Biological Station. It has continued in successful operation since, and has drawn many from the state and from eastern states. The Montana Wesleyan University (Methodist), at Helena, was originally of collegiate rank, but owing to financial difficulties it was reduced to the rank of an academy in 1901. The College of Montana (Presbyterian) was for years the only institution for higher education in the state. Financial difficulties caused its suspension about 1898. Many private schools are maintained by the Catholic church. The Sacred Heart Academy at Missoula has an attendance of several hundred, as have also the academies in Butte and other places. A number of business colleges in the various parts of the state have good courses of study. The total amount issued in bonds for buildings for the various state institutions is $835,000. The land grant for public institutions receives additional acreage with the extension of surveys.

Charitable and Penal Institutions.—The penitentiary is located at Deer Lodge. The contract system is in vogue, the contract for the care of convicts being made by the legislature. Of the inmates in 1902, but five were native

born, the remainder of the convicts being from other states. Charities and reform are placed in the hands of a board of three members, appointed by the governor for four years. The reform school is located at Miles City. The school for deaf, dumb and blind is at Boulder, and is controlled by the state board of education. The Soldiers' Home is at Columbia Falls. The retreat for the insane is at Warm Springs. In this, as in the penitentiary, the care of the inmates is by contract.

Finance and Banking.—In 1906 the assessed valuation of real estate in Montana was $104,641,802; of personal property, $88,410,769; and of railroads, $40,901,000; a total of $233,953,571. The state debt is less than $300,000. In 1908 there were 39 national banks, with resources of $38,259,542.81; capital stock of $3,705,000; surplus of $1,549,500; and individual deposits of $26,427,234.82. There are 43 state banks, with resources of $25,309,012; capital stock of $2,745,000; surplus of $538,000; and deposits of $18,982,639. There are 6 private banks, with resources of $1,246,578; capital stock of $180,000; surplus of $76,997; and deposits of $982,071.

Government Reservations.—Notwithstanding the large area of the state a large part of it is set apart by act of congress as reserves. The forest reserves, with about 7,500,000 acres, are mentioned elsewhere. The Northern Pacific Railway Company received a grant from congress approximating 15,000,000 acres. A part of this has been sold to settlers. There are several large Indian reservations in the state. The largest of these, the Crow reservation, occupies nearly half of Yellowstone county, while half of the reservation is in Custer county. It covers an area of 5,475 square miles, much larger than the state of Connecticut. Adjoining this on the east is the North Cheyenne reservation, with 765 square miles. In the northeastern part, with its southern boundary the Missouri river, is the Fort Peck reservation, comprising 2,775 square miles. In Choteau county the Fort Belknap reserve covers 840 square miles. The Blackfeet reserve covers about a third of Teton county. The only Indian reserve west of the divide in the state is the Flathead reservation, covering 2,240 square miles. The total land comprised by Indian reservations is about 7,500,000 acres, or equal to all the forest reserves. There are 300,000 acres in military reservations. The state lands aggregate 3,000,000 acres. This leaves less than 60,000,000 acres as public lands, or held by settlers or mining claimants.

History.—The northwest part of Montana, beyond the main divide of the Rocky Mountains, formed the northeast corner of the 'Oregon country,' secured to the United States by treaty with Great Britain 1846. The part east of the main divide of the mountains formed the extreme northwest of Louisiana, the vast territory reaching from the mouth of the Mississippi north and west to the Rocky Mountains, which France sold to the United States

under Jefferson's presidency, 1803, Apr., for $15,000,000. Jefferson at once sent off the Lewis and Clarke exploring expedition, which, after delays, started from St. Louis in the spring of 1804, wintered 1804-5 about 40 miles above the present site of Bismarck, North Dakota, and going on 1805, Apr. 7, up the Missouri river, reached the Great Falls in central Montana July 15; and Sep. 22 crossed the main divide of the mountains and northwest Montana to a tributary of the Columbia, and thence by the Columbia to the Pacific; whence they returned the next year, 1806, March, from the mouth of the Columbia, over the mountains, on horseback in May, across the present Montana in July and Aug., reaching St. Louis in Sep. The next year Lewis was made governor of Louisiana, which had been made a U. S. territory 1805, with St. Louis as capital. In 1812, upon the admission of the state of Louisiana, the territory was called Missouri, and since that date the whole or parts of it have fallen within various territories, until 1864, May 26, it was set off from Idaho territory as the territory of Montana. By act of 1873, Feb. 17, a tract of about 2,000 square miles was added to Montana at its extreme southwest corner, on account of its inclusion with it by the mountains, and the close connections which had resulted from this fact. The early capital of Montana was Virginia City; since 1875 Helena.

From 1840 to about 1860 the history of Montana is occupied mainly with the missionary labors of Father De Smet and his associates among the Flathead Indians. About 1855 there were rumors of gold. In 1852 a half-breed named François Finlay, in Indian Benetzee, found gold in the sands of Gold creek in Deer Lodge county. Rich discoveries were found in 1861. In 1862 Grasshopper and White's Bar were discovered, and Bannack in January, 1863. Gold dust to the amount of $25,000,000 was taken from Alder gulch in a few months. Last Chance gulch, where Helena now stands, produced many fortunes. The early mining was largely from placers, but the introduction of machinery made the treatment of ores of silver, gold, and copper very productive, and made the permanent prosperity of Butte. The introduction of so many settlers was not without a struggle. The Indians resisted the advance of the white men. Many minor conflicts occurred, but two are worthy of special mention. The war with the Sioux opened in 1876, and was a desperate conflict. General Custer was dispatched against the Sioux, under the leadership of Sitting Bull, numbering 6,000 warriors. Pushing up the Rosebud to its headwaters Custer found the Indians encamped on the Little Big Horn. Custer was surrounded and his entire command massacred, not a man escaping. Within a year a series of victories under General Miles had destroyed the power of the Indians. In 1877 Chief Joseph, of the Nez Perces in the western part of Idaho, and his tribe

prepared to cross the Bitter-Root Mountains against the orders of the government. They crossed the mountains and passed up the Bitter-Root, pursued by soldiers under the command of General Gibbons. At the Big Horn a bloody and indecisive battle was fought. Chief Joseph passed through up the Madison, through the National Park, across the prairie to Snake creek, and was captured only a few miles from the Bear Paw Mountains—a trail of over 1,500 miles, more than half of which was a running battle.

The few settlers which Montana had before the discovery of gold 1861 were hunters, trappers, and missionaries. It was a favorite hunting-ground, and Fort Benton was a seat of the fur-trading interest. The early comers were, many of them, desperate characters, and social order was very uncertain until energetic Vigilance measures were adopted for suppressing disorder. The opening of railroads, the rapid growth of cities and towns, and the movement to become a state, have brought a new condition of things, fully representing order and progress of every kind as well as material prosperity. The constitutional convention to prepare for seeking admission to the Union sat 1884, Jan. 14—Feb. 9, and the constitution framed by it was ratified Nov. 4 by a popular vote of 15,506 against 4,266. Admission to the Union under this was not secured; but 1889, Feb. 22, an act of congress to admit Montana, North Dakota, South Dakota, and Washington was signed by President Cleveland; July 4 a duly called convention met at Helena and framed a state constitution; Oct. 1 this was adopted by popular vote, 24,676 against 2,274, and a state government was elected under it; and Nov. 8 President Harrison by proclamation declared Montana one of the states of the Union.

Government.—The executive of Montana consists of a governor, lieutenant-governor, secretary of state, attorney-general, treasurer, auditor, and superintendent of public instruction, chosen to serve for four years. The legislature consists of a senate whose members (26) are chosen for four years, and a house of representatives (72) to serve two years. The judiciary consists of a supreme court, of three judges elected by the people to serve six years, and of a supreme court clerk, district court judges, county attorneys, and justices of the peace elected by the people. Women who are tax-payers have equal right with men to vote on any matter submitted to tax-payers, and they are eligible to hold county, school, or school-district office, and may vote at any school-district election. The governors of Montana have been: 1864-5 Sidney Egerton; 1865-6 (acting) Francis Meagher; 1866-69 Green Clay-Smith; 1869-70 James M. Ashley; 1870-81 Benjamin F. Potts; 1882-3 J. Schuyler Crosby; 1884-5 B. Platt Carpenter; 1886-7 S. T. Hauser; 1888-9 Preston H. Leslie; 1889-93 Joseph K. Toole; 1893-97 John E. Rickards;

1897-1901 Robert B. Smith; 1901-08 Joseph K. Toole; 1908— Edwin Norris.

Population.—(1870) 20,595; (1880) 39,159, white 35,-385, col. 3,774, incl. 1,765 Chin. and 1,663 Ind.; (1886) 120,000; (1887) 130,000; (1890) 132,159; (1900) 243,-329.

Bibliography.—The following works may be consulted for further information relative to the history and development of the state: Bancroft, *History of the Northwest Coast* (1886); *Idaho and Montana* (1890); Biddle, *History of the Expedition under the Command of Lewis and Clarke* (1842); Davies, *Civics of Montana* (1896); Lewis and Clarke, *Travels from St. Louis by Way of Missouri and Columbia Rivers to the Pacific Ocean* (1804-6); Palladino, *Indians and Whites in the Northwest; or, a History of Catholicity in Montana* (1895); Roosevelt, *Ranch Life and the Hunting Trail* (1888); *Geological Survey of the Territory; Preliminary Report of Montana and portions of Adjacent Territories* (1871); *Wonderland,* issued annually by N. P. railway, St. Paul; *Rocky Mountain Magazine.* Publications from the agricultural experiment stations at Bozeman, from the University at Missoula, and by the various state officers. Annual report, Bureau of Agriculture, Labor and Industry, Helena.

MONTANA, UNIVERSITY OF: the state university opened in 1895, at Missoula, Mont. It was endowed by a grant of land from congress in 1892. Courses are offered in the classics, philosophy, general science, and applied science; there is also provision for graduate work in these courses; a preparatory department is maintained, and there is a summer school of science. The degrees conferred are A.B. and B.S., and the corresponding masters' degrees. Women are admitted to the university. The income is derived mainly from the proceeds of the sale or rental of the land given by congress; state appropriations are also made. In 1907 the students numbered 392, the faculty 26.

MONTANIC, a. *mŏn-tăn'ĭk* [L. *montānus,* dwelling upon the mountains—from *mons,* a mountain]: pertaining to or consisting of mountains.

MONTANIST, n. *mŏn'tăn-ĭst:* a follower of *Montanus* (q.v.), a Phrygian heretic of the 2d century. MON'TANIS'-TIC, a. *-ĭs'tĭk,* pertaining to the doctrines of Montanus. MON'TANISM, n. *-ĭzm,* the tenets of Montanus.

MONTANT, n. *mŏn'tănt* [F. *montant*—from *monter,* to mount—from L. *mons,* a mountain]: a term in fencing; any upright piece in framework.

MONTANUS, *mŏn-tā'nŭs:* a heresiarch in the early Christian Church: a Phrygian by birth, who appeared about 160 at Ardabar, on the confines of Phrygia and Mysia. He was brought up in heathenism, but embraced Christianity with all the fanatical enthusiasm for

which his countrymen were noted.—Montanus's *theory* was the exact opposite of that of the Gnostic sects; yet, *in practice*, it led to a similar exclusiveness and sectarianism. He believed in the constancy of supranatural phenomena *within* the church: the miraculous element, particularly the prophetic ecstasy, was not removed; on the contrary, the necessity for it was greater than ever. He considered those only to be true or perfect Christians who possessed the inward prophetic illumination of the Holy Spirit—they were the true church; and the more highly gifted were to be regarded as the genuine successors of the apostles, in preference to the mere outwardly consecrated bishops. Thus, they formed a religious aristocracy, as arrogant as the Gnostics; the difference between the two being, that the Montanists prided themselves on a kind of inflamed inspiration, and the Gnostics on a calm and serene illumination of the reason. Neither party wished to recede from the Cath. Church, but rather to exist as an esoteric body within its pale. It was persecution, caused, no doubt, by their own insolent obstinacy, that forced them into a sectarian organization. Montanus did not meddle directly with the creed of the church; he was not a thinker, nor a man of much importance intellectually. His efforts were confined to stirring up the Christians generally to what he deemed fresh religious life—to a belief in a fresh outpouring of the Holy Spirit. At first Montanus contented himself with predicting fresh persecutions, exhorting men to greater strictness and holiness of life, and announcing judgments to come upon the persecutors; but his idea of his own mission afterward became more exalted, and he claimed to be in a very special sense a prophet of God—the organ chosen by the Holy Spirit to purify, enlighten, and advance the church. Among the things on which the Montanists laid stress was an ascetic mode of life, scorn of persecution, and love of martyrdom; connected with these, and, indeed, flowing from them, was an aversion to second marriages and to the restoration of the LAPSED (q.v.). Like other enthusiasts, they were firm believers in the near approach of the Millennium (q.v.) and in the visible bodily advent of Christ. Two 'prophetesses,' Priscilla and Maximilla, were associated with Montanus in his work. A decree for the expulsion of Montanus and his followers from the communion of the Cath. Church was issued by Eleutherus, bishop of Rome. The Montanists at once proceeded to organize themselves as a distinct sect. They found a singularly able apologist in Tertullian (who became a Montanist about 200), and they continued to exist till the 6th century.

MONTA'NUS, ARIAS. See ARIAS MONTANUS.

MONTARGIS, *mōng-târ-zhē'* or *-zhēs'*: town of France, dept. of Loiret, at the junction of the canals of Orleans and Briare with that of Loing, 40 m. e.n.e. of the city of

Orleans. Montargis has some cloth and leather manufactures, and considerable trade in corn, cattle, etc. In its vicinity is the extensive forest of Montargis. Pop. 12,000.

MONTAUBAN, *mōng-tō-bŏng'* (Lat. *Mons Albanus*): town of France, cap. of the dept. of Tarn-et-Garonne; in a rich and beautiful country, on a plateau between the rivers Tarn and Tescou, 32 m. n. of Toulouse. It is the seat of a bishop, and has a fine cathedral in the Italian style, finished 1739, on the site of an older monastery, the *Mons Aureolus* (Golden Hill). Montauban is a well-built, handsome town: the houses are mostly of brick. Besides having considerable manufactures, it has great trade in wine, grain, leather, etc.—Montauban was founded 1144 by Count Alphonse of Toulouse, became the seat of a bishop 1317, embraced the Reformation 1572, and suffered severely in the civil wars that ensued. It has acquired historical celebrity as the great stronghold of the Huguenots. Protestantism still is strong, and maintains both an academy and a theological college. Pop. (1901) 30,506.

MONTAUK POINT, *mŏn-tawk':* elevated headland, the extreme eastern point of Long Island, and belonging to East Hampton township, Suffolk county, N. Y. It was the home of the Montauks, a fierce tribe of Indians, about a dozen of whose descendants remain. Montauk Point is the end of a fine high grassy plateau furnishing pasturage for thousands of cattle. On a bluff about 70 feet above the sea, the government has erected a stone light-house 110 feet high, which flashes a white light once in two minutes and can be seen 36 miles at sea. This was the first Fresnel light used in America.

MONTBÉLIARD, *mōng-bā-lyâr'* (Ger. *Mömpelgard*): town of France, dept. of Doubs, 36 m. n.e. of Besançon. It lies in a valley between the Vosges and Jura Mountains, is surmounted by an old chateau, now used as a prison, and has manufactures of cotton goods, hosiery, and silks. Clocks, watches, and agricultural implements also are made. Pop. about 11,000.

MONT BLANC, *mōng blŏng':* highest mountain in Europe; according to the latest measurements, 15,781 ft. above the level of the Mediterranean Sea; one of the Graian Alps. It is in the dept. of Haute-Savoie, France, close to the Italian frontier, 37 m. s. of the e. end of the Lake of Geneva. The vales of Chamouni and Montjoie lie on the w., and those of Ferret and Allée Blanche on the e. side of it. The waters from its w. slopes are drained off to the Arve, thence to the Rhone; while those which rise on the e. are feeders of the Dora Baltea, tributary of the Po. It has 3 snow-clad peaks and 36 glaciers, of which 16 are on the north and 20 on the south side. The highest summit is a narrow ridge 50

yards by 16, called *La Bosse du Dromedaire,* covered with firm snow, and very steep toward the north. In 1760, Saussure offered a prize for the discovery of a practicable route to the summit of M. B., which was gained 1786, June, by Jacques Balmat, a guide. Saussure himself ascended the mountain the following year; and the same feat has since been performed by many, especially since Albert Smith published the well-known pictorial and dramatic description of his ascent in 1851.

MONTBRISON, *mōng-brē-zōng′:* town of France, cap. of the dept. of Loire, 37 m. s.w. of Lyon, at the base of a lofty rock. Pop. 6,235.

MONTCALM DE ST. VÉRAN, *mŏnt-kâm′*, F. *mōng-kâlm′ dĕh săng vā-rŏng′*, LOUIS JOSEPH, Marquis DE: 1712, Feb. 28—1759, Sep. 14; b. near Nîmes, France. He was a soldier from the age of 14 years, when he entered the French army; was made capt. at 18; served with distinction in Italy 1734; in Germany during the war for the Austrian succession; and again in Italy, where he was wounded at Piacenza 1746, and was promoted col. At the opening of the French and Indian war in America, he was sent to Canada 1756, May, to take command of the French troops there. He took Fort Ontario at Oswego, and Fort William Henry on Lake George, from the English. In 1758 he occupied and strengthened Ft. Ticonderoga (Carillon), and awaited, with his 3,600 Canadian volunteers, the attack of Gen. Abercrombie at the head of 15,000 British. In a fierce battle, July 8, the latter were forced to retreat. Lack of provisions and ammunition, and improper support from the home govt., obliged him 1759 to withdraw his forces to the defense of Quebec, on which depended the French dominion in America, and which was threatened by Gen. Wolfe with an army of 8,000 men and a fleet on the St. Lawrence. M. concentrated his force on the Montmorency, and when attacked by Wolfe, July 31, he promptly drove him back with heavy loss; for 6 weeks afterward the British besieged him in vain. Then Wolfe conceived and carried out the bold plan of scaling the cliffs, from the river, above Quebec. This he did in the night of Sep. 12, and the next morning revealed his entire army drawn up on the plains of Abraham, in the rear of the French. M. promptly prepared to meet the unexpected foe. At 10 A.M. the battle opened; M. led his men in person; but the deadly fire of the British threw them into confusion; then the British charged, driving their opponents in every direction. M., though wounded, bravely tried to rally some of his volunteers, when a ball struck him, inflicting a mortal wound, almost at the same time when Wolfe too received his death-blow and was carried off the field. M. died the next morning, and several days afterward Quebec surrendered, and Canada was lost to France. A monument was erected in Quebec 1827 to the memory jointly of M. and Wolfe.

MONT CENIS, *mōng seh-nē′:* see CENIS, MONT: TUNNEL.

MONTCLAIR, *mŏnt-klär′:* town and tp. in Essex co., N. J.; on the Delaware Lackawanna and Western and the New York Lake Erie and Western railroads; 5 m. n. of Newark, 13 m. n.n.w. of New York. It is on the e. slope of the Orange Mountains, 650 ft. above tide-water, and commands magnificent views of the country extending to New York city and bay. It has been built up mainly by New York business men; is provided with road macadamized and gravelled roads extending through its suburbs; has several superior private and public schools, 8 churches, public library, and superb residences; and is a charming place of suburban residence. Watchung, Upper Montclair, and Montclair Heights are extensions of M. proper, and all are supplied with excellent water. Among the attractions are splendid drives to the famous Eagle Rock, Camp Washington, Passaic Falls, Little Falls, and Verona Lake. Pop. (1880) 5,147; (1901) 8,656; (1900) 13,962.

MONT-DE-MARSAN, *mōng-dĕh-mâr-sŏng′:* town of France, cap. of the dept. of Landes, 65 m. s. of Bordeaux. Pop. about 10,700.

MONT DE PIÉTÉ, n. *mōng′ dĕ pē′ā-tā′* [F. mount of piety: It. *monte di pieta*]: charitable institution, frequently managed by the govt., the object of which is to lend money to the very poor at moderate interest. It had its origin at the close of the mediæval period, when all such transactions were in the hands of usurers, to whom the necessities of the poor were an inducement to the most oppressive extortion. Its originator was Francisco de Viterbo, a Minorite friar at Padua. He appears to have procured the sanction of the pope's bull for the founding of the earliest of these charitable banks at Padua 1491, which was so successful as to lead, according to contemporary writers, to the closing of the Jewish banks in that city. The first opened at Rome was under Leo X.; and the Roman Monti di Pieta are confessed to have been at all times the most successful and the best managed in Italy. The institution extended to Florence, Milan, Naples, and other cities. The principle of all was to advance small sums on the security of pledges, but at a rate of interest barely sufficient to cover the working expenses. Should any surplus remain, it was to be expended for charitable purposes. The mont of Milan, nearly 500 years old, formed by union of 36 private concerns, had (1883) a capital of 671,000 Austrian livres. The Mont de Piété system was introduced into Spain, France, Belgium, Germany, the Netherlands, and Russia. In 1873 there were in France 46 Monts de Piété, making yearly loans of 60,000 francs: the most important are at Paris, Lyons, and Marseilles. The M. de P. formed the model of the loan fund board of Ireland. The system has never been successfully introduced into Britain, and is not known to have been attempted in the United States. See PAWNBROKING.

MONTE, n. *mŏn′tā* [Sp. the stock of cards that remains after each player has received his share; L. *mons*, a mountain]: a gambling game played with cards or dice. MON′TE-BANK, n., a gambling-house where monte is played.

MONTEBELLO CASTEGGIO, *mōn-tā-bĕl′lō kâs-tĕd′jo:* village of n. Italy, province of Pavia, 23 m. e.n.e. of Alessandria; in a plain on the banks of the torrent Schizzola. Here the Austrians were defeated by a French army under Gen. Lannes, after a desperate conflict, 1800, June 9. The title Duke of Montebello was conferred on the victorious French gen. five years later. 1859, May, the Austrians were again defeated here by the united armies of the French and Piedmontese.

MONTE CARLO, *mōn′tā kâr′lō:* small town in the territory of Monaco (q.v.), close to the town of Monaco; notorious for its gaming-tables.

MONTE CASI′NO: see CASINO, MONTE.

MONTE-CATINI, *mōn-tā-kâ-tē′nē:* village of Tuscany, on a spur of the Apennines, 29 m. w. of Florence. In the vicinity are the famous mineral springs of M.-C., in high repute for curative properties, especially in diseases of the liver and digestion. Excellent accommodation can be had by visitors both in private establishments and those under govt. direction.

MONTE CHIARO, *mōn′tā kē-â′rō:* town of n. Italy, province of Brescia, on a height on the left bank of the Chiese, in the centre of an amphitheatre of hills. The chief manufacture is silk. In 1796, the Austrians were defeated here by a French army.—Pop. 6,933.

MONTE CHRISTO, *mōn′tā krēs′tō:* small island belonging to Italy, 26 m. s. of Elba. It consists of a mountain of granite 1,983 ft. above sea-level, and is uninhabited except by wild goats and other animals. It is inaccessible except by one narrow landing-place. M. C. has given name to Dumas's well-known novel.

MONTECUCULI, *mon-tā-kô′kô-lē*, RAIMONDO, Count of, Prince of the Austrian empire, and Duke of Melfi: 1608–1680, Oct. 16; b. at the castle of Montecuculi, Modena. He entered the Austrian artillery as a volunteer under his uncle, Ernesto, Count Montecuculi, 1627. During the Thirty Years' War he found many opportunities of distinguishing himself, received rapid promotion, and was employed in various services, military and diplomatic. In 1657, he was sent to support the King of Poland, John Casimir, against the Swedes and Rákóczy, which he did with great effect, compelling Rákóczy to make peace with Poland, and to break his alliance with the Swedes. In the following year, he was made a field-marshal, and was sent to aid the Danes against the Swedes, in which also he was eminently successful. In 1660, he commanded the army sent to oppose the Turks, who had broken into Transylvania, and skilfully kept them in check till the arrival of the French, with whose

assistance he won the great battle of St. Gotthard, on the banks of the Raab, 1664, Aug. 1—the first decided triumph of European tactics and discipline over the mere numbers and daring of the Ottoman hosts. When the war broke out between France and Holland, in which the emperor took part with Holland, M. received the command of the imperial army 1672. He took Bonn, and, notwithstanding the endeavors of Turenne to prevent it, effected a junction with the Prince of Orange. In 1675, he was opposed to Turenne on the Rhine, and they spent four months in manœuvres in which neither could gain any advantage. After this campaign, M. spent the remainder of his days at the imperial court and in the society of learned men. He was himself a man of learning and various accomplishments, and has left works on the art of war, on the Turkish war, and on the war of 1664, also sonnets. Emperor Leopold made him a prince of the empire, and the King of Naples bestowed on him the duchy of Melfi. He lost his life by the fall of a beam as he was entering the castle at Lintz with the imperial court. His writings were published in the original Italian by Ugo Foscolo (2 vols. Milan 1807), and by J. Grassi (2 vols. Turin 1821). See Campori, *M.*, *la sua Famiglia e i suoi Tempi* (1877).

MONTEFIORE, *mon-tā-fē-ō′rā*, Sir Moses: renowned Jewish philanthropist: 1784, Oct. 24—1885, July 29; b. London; descendant of a wealthy family of bankers. He was prominent in the struggle for removing the civil disabilities of English Jews (see Jews). He was for a time high sheriff of Kent; and after long exclusion and repeated re-election, was legally admitted as sheriff of London. While acting in this capacity he was knighted 1837, and afterward raised to a baronetcy 1846, in recognition of his meritorious public services. He distinguished himself by his practical sympathy with his oppressed countrymen in various parts of the East, chiefly in Poland, Morocco, and Turkey; and at different times he undertook missions on their behalf, visiting Damascus 1840, Roumania 1867, and Jerusalem 1875. He was presented with the freedom of the city of London 1873. In memory of his wife he endowed a Jewish college at Ramsgate 1867. In his 100th year he was still hale and well, but died in the following year. He had a clear and active mind, with great practical wisdom and executive force. His high integrity, his devout but broadly tolerant religious spirit, and his genial disposition, were as notable as was his public beneficence.

MONTEGO BAY, *mŏn-tē′gō:* small but flourishing seaport on the n. coast of the island of Jamaica, 17 m. w. of Falmouth. It has a harbor protected by a breakwater, is defended by a battery, and carries on a general trade of some importance. More than 100 vessels annually enter and clear the port. Pop. variously stated, 4,000 to 5,000.

MONTEM, n. *mŏn'tĕm* [L. *mons* or *montem*, a mountain]: ancient custom among the scholars of Eton School of making a triennial procession on Whit-Tuesday, to a certain mound (*ad Montem*) known as the Salt Hill, near the Bath Road, and which was doubtless so called because certain of the boys levied tribute (for *salt*, as the phrase went) from every person present, and even from any chance passer. These juvenile tax-gatherers were attired in fancy dresses of silk. The king and queen, besides many members of the nobility, frequently honored the procession with their presence; and on such occasions, as much as £1,000 has been collected, which was given to the senior scholar to support him at Cambridge. The origin of the custom is unknown. It was discontinued 1847.

MONTENEGRO, *mŏn-tā-nā'grō* (often pronounced and sometimes written MONTENERO; Italian translation of the native name CZERNAGORA, 'Black Mountain'): small but independent and recently extended principality between Bosnia and Albania. Till 1878 it had an area estimated from 1,669 to 1,796 sq. m., and was separated from the Adriatic by a narrow strip of foreign territory; but the Berlin Conference assigned to M. the port and dist. of Antivari, while closing it against the war-ships of all nations. Toward the end of 1880, the port and dist. of Dulcigno (q.v.), heretofore Albanian, became Montenegrin. The latter place Turkey agreed to cede instead of an inland district indicated by the Berlin Conference; but the persistent delay of the Porte to transfer Dulcigno led to strong pressure and a naval demonstration by the western powers. Area of M. about 3,680 sq. m.; pop. about 228,000.

The country, traversed by branches of the Dinaric Alps, is very mountainous, the highest points being Dormitor in the n. (8,146 ft.), and Kom Kutchi in the e. (8,031). In the e. and s., the hills are partly clad with forests. But the higher ridges and plateaus are bare of vegetation; and being generally covered with loose masses of rock, give to M. an aspect of peculiar sterility and desolation. Yet the valleys are highly fertile; those of the Moratscha and Zeta, with the low land on the Lake of Scutari (into which the chief streams of M. debouch), form the granary of the land. The climate of the hill country, which is M. proper, is ungenial; that of the great valley and its connected region is delightful. The fisheries of the lake are productive. Agriculture is carried on wherever practicable. The exports, which may be valued at about $1,000,000, consist mainly of hides, wool, sheep, smoked mutton and bacon, sumach, cheese, and fruit; but as there are hardly any roads other than mere tracks, exports and imports alike have to be conveyed on the backs of mules, or of porters, usually women. The cap. of M., Cettigne or Cetinji, is a village of 2,514 inhabitants. The chief towns, mostly in the newly acquired territory, are Antivari (2,514), Podgoritza (6,534), Dulcigno (5,000), Niksik (3,500), Danilograd (1,500), Spuz, Zabliak, Kolasin.

The Montenegrins or Zrnagorzes are Slavs of the Servian stock, and constitute almost the whole population of the country, the exception being some Albanians and others in the new territory. The natives are handsome, athletic, and very hardy. They have many noble characteristics; their morals are pure, and their family affection strong. They are brave and patriotic, but somewhat reckless, passionate, and fierce. Their modes of warfare, formerly savage, have yielded to civilized methods. Their clan system lends itself to the perpetuation of close alliances and bitter feuds, and the hereditary obligation to avenge blood is fully recognized.

The constitution of the country is usually called limited monarchy; probably it would be safer to speak of it as an absolute hereditary monarchy, in which the council of state and the national assembly have considerable influence on the decisions of the prince. The head of the govt. 1516–1851 was the *Vladika* or prince-bishop, who, besides his proper office as ecclesiastical superior, exercised at the same time those of chief ruler, lawgiver, judge, and military leader. In 1851, the two offices were disjoined, and the vladika was restricted to his ecclesiastical office, while the cares of government were left to the *Gospodar* (hospodar) or prince. Since 1879 the state council consists of eight members, of whom half are appointed by the prince. The country is now divided into 80 districts and four military commands. Besides this, there exist the time-honored patriarchal institutions. An 'elder' presides over each village community; these small communities constitute 40 or more tribes or clans, each of which has again an 'elder' at its head; and groups of allied clans choose a *knjas*. All these various local dignitaries come together to form the *Skupschtina* or national assembly.

The language of the Montenegrins is a very pure dialect of the Servo-Illyrian Slavonic. With the exception of 7,000 Rom. Catholics and 3,000 Mohammedans in the new territory, the Montenegrins belong to the orthodox Greek Church. There are about 2,000 Montenegrins scattered in Austria, Turkey, and Russia; besides small Montenegrin colonies in Alexandria and San Francisco.

The public income amounts to about $1,500,000, and exceeds the expenditure. The public debt was paid off by Russia 1876. The prince's civil list includes $1,750 from home sources, $7,000 from Russia, and $10,000 from Austria. Except the body-guard of the prince, there is no standing army. But as all the inhabitants are trained to arms, they form a permanent militia, and are easily transformed into an army of nearly 30,000 excellent soldiers. According to a plan of reorganization contemplated 1880, there would be a first 'ban' of 26,000 men, and a second 'ban' or reserve of 8,400.

Consult Andric, *Gesch. des Fürstenthumes M.* (1853); Dutschitsch, *Zrna Gora* (1874); Gopcevic, *M. et les Montenegrins* (1877); Denton, *M.* (1877).

History.—M. belonged in the middle ages to the great

Servian kingdom, but after the dismemberment of the latter, and its conquest by the Turks at the battle of Kossovo (1389), the Montenegrins, under their prince, who was of the royal blood of Servia, maintained their independence, though compelled to relinquish the level tracts about Scutari, with their chief fortress of Zabliak, and confine themselves to the mountains (1485). In 1516, their last secular prince resigned his office, and transferred the govt. to the vladika. The Porte continued to assert its claim to M., and included it in the pashalik of Scutari; but the country was not conquered till 1714, and on the withdrawal of the Turks soon afterward, it resumed its independence. In 1710, they had sought and obtained the protection of Russia, the czar agreeing to grant an annual subsidy on condition of their harassing the Turks by inroads, and this compact has, down to the present time, been faithfully observed by both parties. Another part of the agreement was, that the archbishop or vladika was to be consecrated by the czar. In 1796, the prince-bishop, Pietro I., defeated the Pasha of Scutari, who had invaded M., with the loss of 30,000 men; and for the next quarter-century we hear no more of Turkish invasions. The Montenegrins rendered important aid to Russia 1803 against the French in Dalmatia, and took a prominent part in the attack on Ragusa, the capture of Curzola, and other achievements. Pietro II. (ruled 1830–51) made great efforts to civilize his people and improve their condition. He established the senate, introduced schools, and endeavored, though unsuccessfully, to put an end to internal feuds and predatory expeditions into the neighboring provinces. Some Turkish districts having joined M., the Turks attacked the latter 1832, but were repulsed. A dispute with Austria regarding the boundary resulted in a war, which was terminated by treaty 1840. In 1851, the last prince-bishop died, and his successor, Danilo I., separated the religious from the secular supremacy, retaining the latter under the title of Gospodar. This step caused Czar Nicholas to withdraw his subsidy (which was renewed, and the arrears paid, by Czar Alexander II.), and the imposition of taxes thus rendered necessary caused great confusion. This was taken advantage of by the Turks, who, under Omar Pasha, invaded the country; but the intervention of the Great Powers compelled a treaty 1853, Feb. 15. Danilo went in vain to the Paris conference 1857, seeking the recognition of M. as independent. In 1860, the Montenegrins excited an insurrection against the Turkish rule in the Herzegovina, which was soon suppressed, and in return they were so hard pressed by the Turks, that they were glad to agree to a treaty (1862), by which the sovereignty of the Sublime Porte over M. was recognized. Fresh complications caused M. to declare war against Turkey 1875, Jan., but a compromise was effected. M., however, supported the insurrection against Turkey that broke out in the Herzegovina a little later, and was again at war 1876, July.

The Montenegrins co-operated with the Russians against their hereditary enemy during the war of 1877-8; and the Berlin Conference (1878) recognized the independence of Montenegro, and agreed to an important extension of Montenegrin territory.

MONTEREY, *mŏn-tĕ-rā':* Cal., city in Monterey county; on Monterey Bay, and on the Southern Pacific railroad; about 100 miles south by east of San Francisco. The first settlements were made by the Spaniards, and in 1770 they founded here the mission of St. Charles Borromeo of Monterey. It was the capital of the province from 1840 to 1845. Commodore Jones of the United States navy captured the place in 1842, and held it for one day, under the eroneous impression that war had been declared against Mexico. Monterey was the capital of the military government of California in 1847. In 1849 the State Constitutional Convention was held here, and in 1850 the place was incorporated. The city is located in a rich grain and fruit section. Fishing and stock-raising are prominent industries. It is a favorite resort for summer and winter. Some of the noted buildings are Colton Hall, in which the first State Constitutional Convention met, the old custom-house, and the San Carlos Mission. The city is the seat of San Carlos Academy, and it has good public and parish schools and a public library. Pop. (1900) 1,748.

MONTEREY: Mexico, capital of the state of Nuevo Leon; situated at the foot of the Sierra Madre Mountains; 168 miles from the Texas frontier. The most notable industry is an iron and steel mill. Over $25,000,000 are represented by the manufacturing and industrial enterprises of the city. There are two local financial institutions, the Bank of Nuevo Leon, with a capital of $2,000,000, and the Mercantile Bank, with a capital of $2,500,000. The National Bank has a branch here and the Bank of London and Mexico, an agency. The principal educational institutions are the School of Jurisprudence, Normal School for males, Normal School for females and the Academy of Drawing. There are a Natural History Museum and a public library with 4,500 volumes. The principal buildings of the city are the Juarez Theatre, the Cathedral and the churches of San Francisco and the Purisima. The streets are well paved. Four miles distant are the Topo Chico Hot Springs, the hourly output of which is 68,000 gallons. It was founded by the Spaniards in 1585 as Ciudad de Leon, but renamed Metropolitan City of Our Lady of Monterey in 1596. The city was besieged in 1846 by Gen. Taylor and compelled to capitulate. Pop. over 60,000.

The BATTLE OF MONTEREY, 1846, Sep. 19-24, was fought between 6,600 American troops under Gen. Zachary Taylor, and 10,000 Mexicans commanded by Gen. Ampudia. Regarding Monterey as the key to the n. provinces of

Mexico, Gen. Taylor marched s. from Matamoras, where he had been reinforced, and arrived before M. Sep. 9. Finding the city strongly fortified, Taylor began his attack Sep. 19, by opening a heavy bombardment upon it from his batteries; followed by a successful assault on the lower part of the city by Gen. Quitman's brigade, at the same time that a regt. under Gen. Butler effected an entrance at another side. The Mexicans made a stubborn defense. Each strongly built house had to be separately assailed, and its occupants driven out, so that a running fight was kept up from street to street. On the second day Gen. Worth succeeded in storming the bishop's palace, occupying the hill w. of the city, and deemed almost impregnable. The Mexicans were finally driven into the main plaza of the city on the 23d, but did not surrender until the next day. The American loss was 120 killed and 368 wounded; that of the Mexicans is unknown. It was the first battle of the war won by the Americans, and greatly encouraged them.

MONTERO, n. *mŏn-tā'rō* [Sp. *montera*—from *montero*, a huntsman—from *monte*, a mountain]: a kind of cap, properly a huntsman's cap, having a spherical crown, and a flap which could be drawn down over the ears.

MONTE ROSA, *mōn'tā rō'sâ* (*Mons Sylvius* of the ancients): highest mountain in Europe after Mont Blanc. It is in the angle where the w. end of the Pennine meets the Lepontic Alps, and separates the canton of Valais from Italy. The n. portion of the mountain is highest, and forms nine peaks, the highest of which is forked and precipitous, 15,210 ft. above sea-level. Many attempts were made to ascend this peak, but none were successful till 1855. The mountain appears to consist of mica-slate, in some places alternating with gneiss. It is rich in metallic ores, and several mines of gold, copper, and iron are worked. The highest mine is between 10,000 and 11,000 ft. above sea-level, and in the region of perpetual snow. Rye ripens to an elevation of 6,000 ft.; and the vine is found as far up as 3,200 ft.; but there is a difference of nearly 1,000 ft. in the altitude of the corresponding vegetation on the n. and s. sides.

MONTE SAN GIULIANO, *mōn'tā sân jô-lē-â'nò:* town of the island of Sicily, province of Trapani, on a high mountain 4 m. e.n.e. of the town of Trapani. On the mountain (anciently *Eryx*) are the remains of a famous temple of Venus. Pop. 3,250.

MONTE SANT' ANGELO, *mōn'tā sânt ân'jā-lō:* city of s. Italy, province of Foggia (formerly Capitanata), 28 m. n.e. of Foggia; on one of the Gargano group of hills, at a height of 2,790 ft., and has numerous fine churches. It is famed for exquisite honey, gathered from the odoriferous alpine plants of the mountain. Pop. 14,936.

MONTE SARCHIO, *mōn'tā sâr'kē-ô:* town of s. Italy, province of Benevento, 13 m. n.w. of Avellino, on the torrent Correo. Pop. 5,600.

MONTESQUIEU, *mŏn-tĕs-kū′*, F. *mōng-tĕs-ke-éh′*, CHARLES LOUIS DE SECONDAT (Baron DE LA BRÈDE ET DE MONTESQUIEU): philosophical historian: 1689, Jan.—1755, Feb. 10; b. at his father's château of La Brède near Bordeaux; descended from one of the most distinguished families of Guienne. In his youth he was a hard student of jurisprudence, literature, and philosophy. His love of the classical authors was so great, that at the age of 20 he composed a work intended to show that they did not deserve eternal damnation for being pagans. In 1714, he was appointed a councilor of the parliament of Bordeaux, and two years later, pres. of the parliament. His first (published) work was his famous *Lettres Persanes* (Par. 1721), in which, in the character of a Persian, he ridicules with exquisite humor, and clear, sharp criticism, the religious, political, social, and literary life of his countrymen. Although he did not spare the Academy in these *Lettres*, he was admitted a member of it 1728, and would have been admitted sooner, if Cardinal Fleury had not objected on the ground of his jests against religion. In 1726, M. resigned his office in the parliament of Bordeaux, and spent some years in foreign countries. In England, he spent two years, during which he was much in the company of Lord Chesterfield, and was treated with the greatest respect by the most distinguished personages. After his return to Brède, he published *Considérations sur les Causes de la Grandeur et de la Décadence des Romains* (Par. 1734), a masterly view of Roman history, expressed in a sententious, oracular, and vigorous style—the first important essay in the philosophy of history. It was followed, after a long interval, by his *Dialogues de Sylla et de Lysimaque* (Par. 1748), published under an assumed name, in which the motives and feelings of a despot are skilfully analyzed. In the same year appeared his great work, on which he had been engaged for 20 years, the *Esprit des Lois* (2 vols. Geneva 1748), aimed to exhibit the relation between the laws of different countries and their local and social circumstances. It was immensely popular. No fewer than 22 editions were published in 18 months, and it was translated into various European languages. The *Esprit des Lois* is a wonderfully good book, considering the age in which it appeared; by an excellent critic it has been declared 'one of the most important books ever written.' Certainly it is in its department one of the wisest. Without adopting Voltaire's hyper-eulogistic criticism, that 'when the human race had lost their charters, Montesquieu rediscovered and restored them,' it may be said that it was the first work in which the questions of civil liberty were ever treated in an enlightened and systematic manner, and to M., more than to any other man, is it owing that the science of politics has become a favorite subject of study with the educated public. It is interesting to note that M., before publishing the work, submitted it to a committee of his literary friends, six in number, some of much eminence, who unanimously, though with differing

reasons, advised against its publication. It has been pointed out that the literary method as well as the thought of the *Esprit des Lois* is accordant more with English than with French standards: this may account for the fact that its popularity has always been greater in England and the United States than in M.'s own country. M. died at Paris. Of numerous editions of his works, by far the best is that by Édouard Laboulaye (7 vols. Par. 1875–79). See his Life by Louis Vian (2d ed. Par. 1879), and Dangeau's *M.*, *Bibliographie des ses Œuvres* (Par. 1874).

MONTEVIDEO, *mŏn-tē-vĭd'ē-ō*, Sp. *mōn'tā-vē-tha'o*, SAN FELIPE Y SANTIAGO DE; city, capital of the republic of Uruguay, S. America; on the n. shore of the estuary of the Rio de la Plata (here 65 m. wide), and 132 m. e. by s. from Buenos Ayres, with which it has daily communication by an excellent line of steam-vessels. It stands on a small peninsula, and is surrounded by a wall and fortifications. The houses are mostly of one story, with flat roofs. Of public buildings worthy of notice are the cathedral, the town-hall, and the new market. The climate is healthful; but as there are no rivers near the town, water is scarce, and till 1870—when it was introduced by a new aqueduct 40 m. long—was obtainable only from wells, or by collecting rain-water in cisterns. The bay or harbor, about 3½ m. long by 2 broad, presents good facilities for building wharfs, docks, etc., is sheltered from all but the s.w. gales, and averages 16 or 17 ft. in depth; but its depth has diminished about 5 ft. in this century; while its sheltered part, called the harbor, also is shoaling year by year, so that large vessels are compelled to anchor farther out and in an unsafe position. There are plans for its improvement, but they are not prosecuted with energy. The trade of M. V. is extensive; the exports consisting of wool, hides, hair, tallow, salt and dried beef, bones, etc.; and the imports, of cotton and woolen fabrics, hardware, also flour, wine, spirits, and other provisions. The chief trade is with Great Britain. M. has steam-communication with the United States, Rio Janeiro, Britain, and Genoa; and has considerable trade with France, Spain, La Plata, and Italy. In 1880 entered 1,076 vessels, of 794,443 tons; and 871, of 713,177 tons, cleared the port. Imports 1880 amounted to about $16,167,500; exports to about $10,238,800. Pop. (1862) with the small suburbs Cordon and Aguada 45,765: (1871) 105,296; (1901) with its environs 278,186, one-third foreigners.—For the history of M., see URUGUAY.

MONTESQUIEU.

MONTEZUMA I., *mŏn-tē-zō′ma*, Emperor of Mexico—the most able of the Mexican emperors: ascended the throne about 1437; died 1471. Early in his reign he commenced a war with the neighboring monarch of Chalco, which resulted in the annexation of that kingdom to Mexico. Tlatelolco, Cuihixcas, and Tzompahuacan were afterward annexed. Some reverses which his arms now suffered led to a confederacy of the Tlascalans and two other powerful tribes against him; but in the war which followed, M.'s arms were again signally triumphant, and the territories of the conquered tribes increased the domain of the now all-powerful Montezuma.

MONTEZU′MA II., Emperor of Mexico—the last before its subjugation by the Spaniards: succeeded to the throne 1502; died 1520, June 30. He had distinguished himself as a warrior during the reign of his predecessor, and after his accession, carried the terror of his arms to the frontiers of Nicaragua and Honduras. He was at the same time a member of the priestly order, and did not demit his functions on his accession. He devoted his chief attention to the improvement of the laws and of the internal administration, and displayed his taste for pomp and luxury by the magnificence of his household arrangements and a profuse embellishment of his capital. This necessitated heavy taxation, which, combined with the strictness of his administration, led to continual revolts among his subjects, especially those who had lately come under his sway. When Cortes landed in Mexico with his small army 1519, M., blinded by an old prophecy, and by the strange appearance of the invaders, acknowledged them as beings of a superior order, and as his masters (see CORTES). The inhabitants of Mexico having risen against Cortes, the latter caused M., who was then his prisoner, to appear in order to pacify them; but being wounded accidentally by a stone flung from among the crowd of his own subjects, he so keenly felt the indignities which he had suffered, that he repeatedly tore the dressing from his wound, and soon afterward died. Some of his children adopted the Christian religion, and his eldest son received from Charles V. the title Count of Montezuma. One of his descendants was viceroy of Mexico 1697–1701. His last descendant, Don Marsilio de Teruel, Count of Montezuma, was banished from Spain by Ferdinand VII., and afterward from Mexico, on account of his liberal opinions, and died at New Orleans 1836.

MONTFERRAT, *mōnt-fär-rät′*: formerly an independent duchy of Italy, between Piedmont, Milan, and Genoa, now forming part of the kingdom of Italy. It consisted of two separate portions, Casale and Acqui, between the Maritime Alps and the Po; more than 1,300 sq. m.; cap. Casale. M., after the downfall of the Frankish empire, was ruled by its own margraves till the beginning of the 14th c. This illustrious house for a long time disputed the sovereignty of Piedmont with the House of

Savoy, and sent to the crusades more heroes than any other sovereign house in Europe. Members of the family ruled simultaneously in M., Thessaly, and Jerusalem. On the death of the Marquis John I., 1305, his sister, Iolande or Irene, Empress of Constantinople, succeeded to M.; and her second son became the founder of the family of Montferrat-Palæologus, which became extinct 1533, and M. passed to the Gonzagas of Mantua. In 1631, the dukes of Savoy obtained possession of a portion of M., and 1703, with the consent of the German emperor, the remaining portion passed under their sway, and was incorporated with their own dominions.

MONTFORT, *mŏnt'fort*, F. *mōng-for'*: noble French house, descended, according to the most probable opinion, from Baldwin, Count of Flanders, and Judith, daughter of Charles the Bald. AMAURI 2d, Seigneur de M. (a little town between Paris and Chartres), is the first of the family mentioned in history. He lived in the first half of the 11th c. His son, SIMON 1st, had for his third wife Agnes, daughter of Richard, Comte d'Evreux. He left four sons, of whom only AMAURI 4th had issue. The grandson of this Amauri, SIMON 3d, surnamed the *Bald*, Comte de M. and Evreux, married Amicie, daughter of Robert de Beaumont, Earl of Leicester. His second son was the famous SIMON 4th, Comte de M. and Earl of Leicester, subsequently Comte de Toulouse (abt. 1150–1218, June 25), conspicuous in the terrible crusade against the Albigenses (q.v.). In 1198, he went to Palestine at the head of a troop of French knights, but failed in doing anything against the Saracens, and was compelled to return. In 1202, he joined the 4th crusade, which, however, had no religious design at all (see CRUSADES), in consequence of which M. abandoned it. In 1209, he took part in the war of extermination against the Albigenses. He signalized himself by relentless ferocity and his brilliant successes, but was killed by a stone at the siege of Toulouse. He was father of Simon de M., Earl of Leicester.

MONTFORT, SIMON DE, Earl of Leicester: about 1200–1265, Aug. 4; b. France; fourth son of Simon 4th, who was Comte de M. and Earl of Leicester. The title Earl of Leicester came to M. by his grandmother, Amicie de Beaumont, sister and heiress of Robert, Earl of Leicester; but he did not directly or immediately inherit it, for, during the reign of King John, it was borne by Ranulf, Earl of Chester. Some time after the death of Ranulf, M. came to England, and offered his services to Henry III. Already he had great reputation as a warrior, and Henry was so highly pleased with the young French noble, that he conferred on him the title Earl of Leicester. Little did Henry think that the stranger was to prove against himself a great founder and champion of English constitutional liberty. He married Elinor, sister of King Henry III., youthful widow of that Earl of Pembroke to whom, more than to any

other, the people of England owe Magna Charta. After this marriage—which was viewed with disfavor by the king—De M. became a steadfast advocate of the English Charter and of the liberties of the people as against oppression by the crown and undue exaction by the Roman see. After visiting the East, he was sent by the king to undertake the command of Gascony. In 1257, the king's debts were so great, and the rapacity of his foreign relations so unbearable, that the people were in a state of insurrection. The barons assembled, and, under the direction of De M., held the celebrated parliament at Oxford. They passed statutes to enforce the provisions of Magna Charta. The king swore to observe them, but sent forthwith to the pope, praying to be absolved from his oath. The bull of absolution arrived. Henry set his barons at defiance, shut himself up in the Tower, and appealed to Louis of France. England was now in arms. The whole middle class looked up to De M. as their champion and leader, and the war began with the battle of Northampton. The wars of the barons, under De M., have been superficially viewed as the strife of turbulent nobles, who, in the absence of foreign warfare, employed themselves in a contest at home. Later researches, however, have shown that, but for the struggles of De M. and the barons, the concessions at Runnymede would have been a mere worthless parchment. At Lewes, the royal forces were signally discomfited, and the king taken captive. A French chronicler, who praises De M. as 'noble, chivalrous, and the ablest man of the age,' expressly adds that he was 'backed by the general favor of the people,' who at this time were 'unspeakably trampled under foot, and deprived of all their liberties.' The conditions exacted from the king were, that he should observe Magna Charta and the Charter of the Forests; be moderate in his expenses and grants, until his old debts were paid off, and until he was enabled to live on his own property, without oppression of merchants or the poor; and that Englishmen only should be chosen counselors. No new pretensions were introduced, even at this moment of triumph, and the constitutional maxim of respecting the person of the king was carefully upheld. The queen (Elinor of Provence), who was in France, now occupied herself in collecting a large army. To deliberate on the measures to be adopted at this great crisis, writs were issued to the sheriffs, 1265, by De M., directing them to return two knights for each county, and two citizens or burgesses for every city and borough; and from this time may be clearly dated the recognition of the commons as an estate of the realm in parliament. Guardians had been appointed by the barons to watch over the execution of Magna Charta, but 50 years of encroachment on the part of the crown convinced De M. that a stronger and more enduring security would be to commit the care of constitutional freedom thenceforth to the people themselves, whose interests the

barons thus identified with their own. Mr. Blaauw, who, in his *Barons' War*, presents De M. almost for the first time in his true character, against the mistaken statements accepted by Hume and others, adds, that 'it should be an honest pride to us in after-times that English liberty thus owes its birth to the noblest parentage, confidence in the people': probably it would be more accurate to speak, in connection with De M., not of the 'birth' of English liberty, but of its furtherance at an important crisis. A second war broke out, and this time the popular cause was weakened by defection and treachery. Prince Edward (afterward Edward I.) encountered the barons at Evesham, with a greatly superior army. When defeat was inevitable, the great leader refused to flee. He 'fought stoutly like a giant for the liberties of England,' but fell, overwhelmed by numbers. The death of De M. filled the whole land with mourning. Like Cromwell, whose career in many respects resembles his own, he was denied a grave by the royalists, his head being sent to Wigmore Castle, and his mutilated limbs to different towns; but the people bewailed their dead champion, and the clergy pointed to his glorified spirit in heaven: the people even revered him as a saint and martyr, and invoked his intercession. The influence of De M. was such after his death that it was not deemed prudent to put to death any of the barons who had borne arms against his sovereign; and though the Oxford statutes were formally rescinded, their spirit remained. See *Life*, by M. Creighton (1876), and *Simon de Montfort*, by Pauli, translated by Una M. Goodwin (1876).

MONTGOLFIER, *mŏnt-gōl'fĭ-ėr*, F. *mōng-gol-fe-ā'*, JACQUES ÉTIENNE; and JOSEPH MICHAEL: two brothers, distinguished as inventors of the first kind of Balloons (q.v.): Étienne d. Servières 1799: Joseph, the elder brother, d. Paris 1810. They were sons of a noted paper-manufacturer at Annonay, dept. of Ardèche, and early engaged in the same industry. Etienne, after a few successful experiments with the balloon, repaired to Paris; but though his discovery created a great sensation, and was followed out in practice by many eminent men, he obtained little pecuniary aid in carrying on his experiments, and at length retired to his native town, and there resumed the manufacture of paper.—The elder brother, Joseph, had much genius and little education; but the two brothers were fitted to supplement each other's deficiencies, and together they made many discoveries, and both were received as members of the French Acad. Joseph invented the hydraulic screw, the calorimeter, etc., and in the latter part of his life filled a post in the dept. of arts and manufactures.

MONTGOMERY, *mont-gŭm'ér-ĭ:* city, cap. of Montgomery co. and of the state of Alabama, on the Alabama river, 180 m. n.e. of Mobile by railroad, 330 m. by steamer. Seven railroads, the Louisville and Nashville, Western, Georgia Central, Mobile and Ohio, Atlantic Coast Line, Seaboard Air Line, and Union Springs and Northern, furnish connection with all inland points, while steamers connect with Mobile lines from various domestic and foreign ports. It is in a rich cotton-growing region, and its annual receipts of this staple range from 150,000 to 175,000 bales. In recent years there has been a great increase of manufacturing, with a rapid development of commercial interests and growth in population. The city has numerous churches, good schools, which are free and are open nine months each year, several private schools, three daily newspapers, three national and one private bank, a widows' and an orphans' home, and an infirmary for the sick and poor. M. is beautifully located and is one of the most healthful cities in the south. Water is supplied by the Alabama river, also by an artesian system which furnishes 5,000,000 gallons per day and the works for which cost $300,000. The state-house on Capitol Hill, a fine structure, was rebuilt, 1851. Among notable buildings are the city hall, court-house, and masonic temple. The city is lighted by gas and electricity, and has two lines of electric street railroad. In 1900 it had 163 manufacturing establishments, employing $2,930,782 capital and 2,563 workmen and clerks, paying $802,183 in wages, and turning out $5,035,190 in products. There are a cotton-mill; cotton-seed-oil mills, ice factories, a large flour-mill, carriage and wagon shops, foundries, wood-working factories, a vinegar factory, a paper-box shop, a brewery, etc. Among the other manufactures are alcohol, candy, crackers, brooms, soap, and fertilizers. M. was settled 1817. It received its name from Gen. Richard Montgomery. M. was made the first capital of the Southern Confederacy, whose government was organized there 1861, 4 Feb. The next year the capital was removed to Richmond; the Union Army re-occupied Montgomery 1865, 12 April. Pop. (1900) 30,346.

MONTGOMERY, *mont-gŭm'ér-ĭ,* GABRIEL, Comte DE: French knight of Scottish extraction, officer in the Scottish Life-Guard of the king of France: abt. 1530-1574, May 27. At a tournament given 1559, June 30, by Henry II. in honor of his daughter's marriage with Philip of Spain, the king insisted upon young M. entering the lists with him. M. reluctantly complied, and the shaft of his broken lance entering the king's visor at the eye, Henry II. was borne insensible from the ground, and so continued 11 days, when he died. M., though blameless, left France, and soon afterward embraced Protestantism in England. On the commencement of the religious wars 1562, he returned to his native country to support

the Prot. cause, was one of the Prot. leaders, defended Rouen with great bravery, and gained advantages over the royalists. During the massacre of St. Bartholomew, he happened to be in Paris, and owed his escape to the swiftness of his horse, and fled to England. In 1574, at the head of a band of Huguenots, he landed in Normandy, and commenced war; but being compelled at last to surrender the castle of Domfront, he was carried to Paris; and though the general to whom he surrendered had assured him of his life, he was beheaded, after long imprisonment.

MONTGOM'ERY, JAMES: minor British poet: 1771, Nov. 4—1854, Apr. 30; b. Irvine, Ayrshire, Scotland; son of a Moravian preacher. At the age of seven years he was sent to the Moravian settlement at Fulneck, near Leeds, to complete his education for the Moravian pastorate. At Fulneck, the course of study seems to have been too severe in its character for the young poet; the imaginative side of his mind was allowed no recognition, and it was only by stealth that he read Cowper's poems and *Robinson Crusoe*. Much of his leisure at school was employed in the composition of verses and of music. In 1789, he ran away, and, after four years of various employment, became engaged as clerk to the editor of *The Sheffield Register*, for which he soon began to write political articles. In 1794, he commenced a newspaper of his own, *The Sheffield Iris*, which he continued to edit till 1825, when he retired. During his editorship, M. was twice subjected to fine and imprisonment: 1795 he was fined £20, and sentenced to three months' imprisonment, for printing some copies of a miserable ballad in which govt. suspected that sedition lurked; and 1796 he was fined £30, and imprisoned six months, for giving an account of a Sheffield riot. He received a govt. pension of £150 in 1835, and he died at his own house in Sheffield. His principal works are: *The Wanderer of Switzerland* (1806); *The West Indies* (1809); *The World before the Flood* (1812); and *The Pelican Island, and Other Poems* (1827). A collected ed. of his minor poems appeared 1851; and 1853 his *Original Hymns for Public, Private, and Social Devotion* closed the series. See his Memoirs, of value as materials for the provincial political history of his times (7 vols. 1856–58).

His poems are melodious, full of picturesque description and the gentlest human feeling. The personages introduced in his poems are, however, only shadows, or touched with the faintest color of character. But he holds a well-defined position among the favorite poets of his country by several of his hymns and minor poems, and by his exquisite verses on Home, which commence the third part of *The West Indies*. His poetic repute has suffered somewhat by his being confused with Robert Montgomery (q.v.).

MONTGOM'ERY, JOHN BERRIEN: 1794, Nov. 17—1873, Mar. 25; b. Allentown, N. J.; entered the U. S. navy 1812, and as midshipman took part in the attack on Kingston, Canada, and the capture of Little York, Fort George, and Newark. In 1813, Sep. 10, he was with Perry when he captured the British fleet on Lake Erie, and received the thanks of congress and a sword for his gallant services. 1814, Aug., he assisted in the attack on Mackinaw. In 1815 he fought with Decatur against the Algerine pirates; and 1818, Feb., was promoted lieut. Made commander 1839, he took part in the Mexican war, in the blockade of Mazatlan, and in the capture of Guaymas on the Gulf of California. He was executive officer of the navy-yard at Washington 1849–51; 1853 was commissioned capt.; 1857 commanded the *Roanoke* and brought Walker's 250 filibusters to New York; 1859–62 commanded the Pacific squadron; 1862 was retired as commodore; and 1866 was made rear-admiral. He died at Carlisle, Pa.

MONTGOM'ERY, RICHARD: 1736, Dec. 2—1775, Dec. 31; b. near Feltrim, Ireland. Educated at Trinity College, Dublin, he entered the English army as ensign at the age of 18. In 1757 his command was ordered to Halifax, N. S., and soon afterward he took part in the siege of Louisburg, where he was made lieut.; was with Amherst in his expedition against the French on Lake Champlain in 1759; next year he became adjt.; served in the campaign against Montreal, and was made capt. 1762. Then he was ordered to the W. Indies; but, 1763, returned to New York, soon afterward going to England, where he formed the friendship of many influential liberal members of parliament. In 1772 he sold his commission, and next year came to America, bought a farm near New York, and married the daughter of Judge R. R. Livingston. He was chosen a delegate to the first provincial congress, New York, 1775, May; and in June was made a brig.gen. in the continental army, being the only officer of that rank not from New England. Owing to Gen. Schuyler's illness, M. was put in command of the expedition to Canada, and in the face of great difficulties and discouragements in a short time took the forts of St. Johns and Chambly, and, 1775, captured Montreal. His army by this time numbered only about 300 men, to which Arnold's command of 600 men was added, with which meagre force he besieged Quebec 1775, Dec., having been promoted to maj.gen. for his services. The cold weather, the breaking out of small-pox in the army, and the fact that the term of service of most of his men was about to expire, constrained him to urge an immediate assault on the city. He himself led the attack on the s. part of the lower town, in a heavy snow-storm Dec. 31. The first barrier was gallantly overcome, and M. was leading his men on with cheering words, when a British discharge of artillery killed him and his two aids, and threw his command into confusion, so that the British succeeded in driving the Americans back and

capturing about 400 of their men. The British joined the Americans in paying tribute to his bravery, the gov. and city officials burying him with military honors, while congress passed resolutions of 'grateful remembrance, respect, and high veneration,' and erected a monument to his memory in front of St. Paul's Church, New York. In parliament Burke lauded his virtues. On the rocks over Cape Diamond, where he led his men and was killed, have been inscribed the words: 'Here Major-General Montgomery fell, December 31, 1775.' In 1818, by a special 'act of honor' of the N. Y. legislature, the gov.-gen. of Canada was requested to permit the remains of M. to be removed to New York. This being granted, they were buried in St. Paul's Chapel, near the monument erected by congress to his memory. His widow survived him 52 years, dying 1828.

MONTGOM'ERY, ROBERT: clergyman and verse-maker, who gained notoriety, if not fame: 1807–1855, Dec. 3; b. Bath, England. He graduated B.A. at Oxford 1833, M.A. 1838, and was ordained 1835. In 1836, he became minister of Percy Street Episcopal Chapel, London: he afterward removed to Glasgow, where he preached four years, but returned to London, and resumed office at Percy Street Chapel 1843. M.'s works comprise a large number of volumes in prose and verse, on themes more or less sacred. He is best known by his so-called poems; and these are made notable by Macaulay's scathing ridicule of them, which, however, did not check their sale. Macaulay, in his essay, points out M.'s feebleness and absurdity in thought and expression. *The Omnipresence of the Deity* (1828) reached its 28th ed. 1858. But M.'s works have now become part of the lumber of libraries.

MONTGOM'ERY, WILLIAM READING: 1801, July 10—1871, May 31; b. Monmouth co., N. J. He was educated at West Point, graduating 1825, when he became lieut., and was on garrison duty till 1838. Then he was made capt., serving on the Canadian border 1838–40, in the Florida war 1840–42, and taking part in the occupation of Texas 1845. During the Mexican war he was twice wounded—at Resaca de la Palma, when he was made brevet major, and at Molino del Rey, after having been made commander of his regt. As such he led it at Chapultepec and Mexico. He was then brevetted lieut.col., and commissioned maj. 1852. In 1855 he was removed from the army because of his sympathy with the free-state men in Kan., where he then was stationed. When the civil war began, he at once raised the 1st regt. N. J. volunteers, and was with the army in its defeat at Bull Run. In 1861, May, he was made brig.gen. of vols. and military gov. of Alexandria, Va., as afterward he was of Annapolis, Md. Then he was stationed at Philadelphia till 1863, and at Memphis, Tenn. Owing to failing health he resigned 1864, Apr. 4, and entered business in Philadelphia. He died in Bristol, Penn.

MONTGOM'ERYSHIRE: inland county of n. Wales, between Shropshire on the e. and the Welsh counties, Merioneth and Cardigan, on the w.; greatest length s.e. to n.w. about 40 m., breadth about 35 m.; 495,089 acres or about 773 sq. m., of which about 80,000 acres are under tillage. The surface is almost wholly mountainous, largely bleak elevated moorlands; but toward the English border are several warm, fertile, and well-wooded valleys. Offa's Dyke traverses the s.e. corner. The Severn, the Vyrnwy, and the Dovey are the principal rivers. The county belongs almost entirely to the basin of the Severn. The mineral wealth of M. is not great, but copper, lead, and zinc are procured, and millstones, slates, and limestone are quarried. On the uplands, the soil is poor, and suited principally for mountain pasture; but in the valleys grain and flax are raised. Cattle and sheep and the pure breed of Welsh ponies called 'Merlins' are reared. The Welsh-flannel manufacture is extensive in the county. The cap. is Montgomery (pop. 1,500), from which the county received its name, and which was so called from Roger de Montgomery, Earl of Arundel and Shrewsbury, who, 1093, recaptured the town and castle, which had been wrested during the previous year by the Welsh from the founder, Baldwin, lieut. of the Marches to William the Conqueror and William Ruffus. The county sends one member to the house of commons. The county business is carried on at Welshpool and Newtown alternately. There is excellent trade in cattle and horses.—Pop. (1871) 67,623; (1881) 65,798; (1891) 58,003; (1901) 54,892.

MONTH, n. *mŭnth* [AS. *monath*, a month—from *mona*, the moon: L. *mensis;* Gr. *mēn;* Ger. *monat*, the period of the moon's revolution: Goth. *mena;* Icel. *mana;* Ger. *mond;* Gr. *mēnē*, the moon]: the twelfth part of the year; in popular usage, four weeks. MONTH'LY, a. *-lĭ*, happening once a month, or every month; lasting a month; performed in a month: AD. in every month: N. a monthly publication. CALENDAR MONTH, one of the twelve divisions of the year, from 28 to 31 days in each. LUNAR MONTH, one revolution of the moon, occupying from one new moon to another, about 29 days, 12 h., 44 min. MONTH'S MIND (in the old English sense of *month's remembrance*), in the Rom. Cath. Church, a memorial office for the dead, either continued through a month after decease, or repeated at the end of a month. THIS DAY SIX OR THREE MONTHS, in *Parliament*, a common motion, when the rejection of a bill is desired, that its next stage shall be taken at a time when the house will not be sitting—should the motion be carried, such a bill cannot be reintroduced in the same session.

MONTH: originally the period of the moon's revolution round the earth. If this is reckoned from the position of the moon among the stars to her return to the same position, the period is called a *sidereal* month, and consists of 27 days, 7 hours, 43 minutes, 11½ seconds; but if from new moon to new moon, it is longer, being 29 days, 12 hours, 44 minutes, 3 seconds; this is called a *synodic* month (see MOON). The latter period forms one of the three natural measures of the lapse of time, and, notwithstanding that its efficiency depends on the state of the atmosphere, it ranks next to the day in importance. There are several other periods used by astronomers to which this name is applied, as the *tropical* or *periodic* month (27 days, 7 hours, 43 minutes, 4·7 seconds), reckoned from the moon's passing the equinox till her return to the same point; the *nodal* month (27 days, 5 hours, 5 minutes, 29 seconds), from ascending node to ascending node; the *anomalistic* month (27 days, 13 hours, 18 minutes, 37 seconds), from perigee to perigee; and the *solar* month, the twelfth part of a solar year, consisting of 30 days, 10 hours, 29 minutes, and 4 seconds. Distinct from all these is the *civil* or *calendar* month, fixed by law for ordinary purposes, and consisting of a fixed number of days—from 28 to 31—according to the particular month. The calendar months are as follows:

	Days.		Days
1. January,	31	7. July,	31
2. February,	28	8. August,	31
" (leap years),	29	9. September,	30
3. March,	31	10. October,	31
4. April,	30	11. November,	30
5. May,	31	12. December,	31
6. June,	30		

See also the separate months under their own titles. The names by which the months are designated throughout Christendom were given them by the Romans, though Charlemagne in the 9th c., and the French directory in the end of the 18th c., attempted to substitute descriptive epithets.

MONTHOLON, *mōng-to-lōng'*, CHARLES TRISTAN DE, Comte, afterward Marquis DE: 1782–1853, Aug. 21; b. Paris; descended from an ancient French family. At the age of 10 he entered the navy, but exchanged it for the army in 1798. His rise was rapid. He displayed great zeal on behalf of the first consul in the revolution of 18th Brumaire, in the capacity of *chef d'escadron*. He served in a number of campaigns, and was severely wounded at Wagram. Napoleon made him his chamberlain in 1809. He was made a general of brigade in 1814, and appointed to the chief command in the department of Loire. On Napoleon's abdication, M. remained in France, but held aloof from the Bourbons. No sooner had the emperor escaped from Elba and landed at Fréjus, than M. hastened to join him. He was present at Waterloo, and accompanied Napoleon to St. Helena, continuing his devoted attentions to him till he breathed his last, and being named

in his will as one of his trustees, spared no exertion to carry its provisions into effect. Along with Gen. Gourgaud, he published *Mémoires pour servir à l'Histoire de France sous Napoléon, écrits à Ste.-Hélène sous sa dictée* (8 vols. Par. 1823). He afterward published a work entitled *Récito de la Captivité de Ste.-Hélène* (London. 1847). In the proclamation which Louis Napoleon issued on his landing at Boulogne in 1840, M. was named chief of his staff, and on this account he was condemned by the chamber of peers to 20 years' imprisonment; but he was afterward pardoned.

MONTH'S MIND: see OBIT.

MONTI, *mon'te*, VINCENZO: regenerator of modern Italian poetry: 1753, Feb. 19—1828, Oct. 13; b. in the Roman province of Ferrara. He studied in the Univ. of Ferrara. On the termination of his studies, he went to reside in Rome (1778), where M., whose fault through life was a hasty susceptibility, became involved in a bitter squabble with Alfieri, whose fame as the master-tragedian of Italy was then in the ascendant—a fact which may have been unpalatable to M., in consequence of the failure of his own dramatic attempts. The assassination of Basville, the republican envoy of France, afforded to M. a subject for his poem, *La Basvilliana*. His two succeeding poems, the *Musogonia* and the *Feroniade*, contained bitter invectives against France and Bonaparte; but on the appearance of a French army before Rome, M., with the inexcusable inconsistency which characterized his political conduct throughout, hastened to espouse the cause of France, and to invoke the protection of Bonaparte. M. was shortly afterward appointed sec. of the Cisalpine Directory; and 1789 went to France, where he undertook the translation of Voltaire's poetical works. Returning to Italy, he was appointed prof. in the Univ. of Pavia. On the fall of the empire, M. became the eulogist of the Austrian possessors of his country. Through all these political vicissitudes, he pursued with vigor his studies of the classics, and accomplished one of his greatest works, the translation of the *Iliad* into Italian verse. M. died at Milan. The best editions of his works are those of Milan (1825–27, 8 vols.), and *Opere Inedite e Rare* (Milan 1832–3, 5 vols.). M. had warm admiration of Dante, and partook, in some degree, of the quality of the great master. His best works are distinguished by sustained grandeur of imagery and diction, by daring flights of imagination, and by the delicacy, elevation, and fire of the sentiments.

MONTICELLO, *mŏn-tē-sĕl'lō:* for 60 years the home of Pres. Thomas Jefferson; 3 m. w. of Charlottesville, Albermarle co., Va. The mansion, completed about 1774, was one of the most beautiful in the South, and the grounds were laid out in the most attractive manner. The grave of Jefferson, in a family cemetery close by, is marked by an obelisk of granite. Soon after the death of its founder the estate passed out of the possession of his family, and the mansion has fallen into decay.

MONTICLE, n. *mŏn'tĭ-kl*, or MON'TICULE, n. *-kūl* [a dim.—from L. *mons* or *montem*, a mountain or great hill]: a little mount; a hillock. MONTICULATE, a. *mŏn-tĭk'ū-lāt*, having many small projections. MONTON, n. *mŏn'-tŏn*, among *miners*, a heap of ore; a mass under the process of amalgamation.

MONTILLA, *mōn-tēl'yâ:* town of Spain, in the modern province of Cordova, 20 m. s.s.e. of the city of Cordova; on a hillside rising from the s. bank of a tributary of the Xenil. Manufactures of coarse linen and earthenware are carried on, and oil-mills are in operation. A famous pale, dry, light wine is grown in the vicinity; and from the name M. is named the sherry known as Amontillado. M. was the birthplace of Gonzalo de Cordova, the 'Great Captain.' Pop. about 14,000.

MONTJOIE ST. DENIS, *mōng-zhwâ' săng dĕh-nē':* war-cry of the ancient kings of France, said to be as ancient as the days of Clovis, and from which the king-of-arms, Montjoie, who had exclusive jurisdiction in French heraldry, derived his title.

MONTLUCON, *mōng-lü-sōng':* town of central France, dept. of Allier, picturesquely situated on a hill on the right bank of the Cher, 40 m. w.s.w. of Moulins. It has extensive manufactures of iron, steel, and plate-glass, besides lime-kilns, saw-mills, and woolen-mills. Its railway connections are abundant, and it has trade in corn, wine, and fruits. M., as a great industrial centre, has sometimes been called the French Manchester. At a distance of 10 m. are the wells of Néris-les-Bains, famous in the time of the Romans—of whom many traces are left—and still frequented by invalids.—Pop. (1881) 24,767; (1886) 26,250; (1896) 31,595.

MONTMARTRE: see PARIS.

MONTMORENCY, *mōng-mo-rŏng-sē*, ANNE, first Duc DE, Marshal and Constable of France: b. 1493, Mar.—1567, Nov. 12; b. Chantilly; of one of the oldest and greatest of the noble families of France, named from Montmorency, place about 9 m. n.n.w. of Paris. He received, it is said, the name of *Anne* from his godmother, Anne of Brittany. He distinguished himself by gallantry and military skill in the wars between Francis I. and Emperor Charles V., and was taken prisoner with his sovereign in the battle of Pavia, fought against his advice. He afterward became the leader of the French govt. showing great ability in finance and diplomacy, and was made constable 1538; but his rough manners made him an object of dislike to many; and the suspicions of the king having been aroused against him, he was suddenly banished from court 1541, and passed ten years on his estates, till the accession of Henry II., when he came again to the head of affairs. In 1557, he commanded the French army which suffered the terrible defeat of St. Quentin, in which he was taken prisoner. During the minority of Charles IX., M., with the Duke of Guise and the Marshal St. André, composed the

famous triumvirate which resisted Catharine de Medici. In 1562 and 67, he commanded the royal army against the Huguenots, and in both wars gained victories, but received a fatal wound at St. Denis, and died at Paris on the following day.

MONTMORENCY', Henri II., second Duc de: 1595, Apr. 30—1632, Oct. 30; b. Chantilly; grandson of the famous Constable de M. His godfather was the great *Henri Quatre,* who always called him his 'son.' When he was 17 years of age, Louis XIII. made him admiral, and he defeated the Huguenots in Languedoc, and took the Isle of Ré from those of Rochelle. He afterward gained other victories over them, and 1630 received the chief command of the French troops in Piedmont, where he defeated the Spaniards, for which he received a marshal's baton. Unhappily for himself he ventured to oppose Richelieu, who had always been his enemy, and espousing the cause of Gaston, Duke of Orleans, led the rebel army; for this he was declared guilty of high treason, and Marshal Schomberg being sent against him, defeated him at Castelnaudary, and took him prisoner. Montmorency, though almost mortally wounded, was carried to Toulouse, sentenced to death by the parliament, and notwithstanding his expressions of penitence, and the most powerful intercessions made for him—e.g., by King Charles I. of England, the pope, the Venetian Republic, and the Duke of Savoy—was beheaded. Montmorency was distinguished for amiability and courtesy of manners, as well as for valor.

MONTMORENCY' (or Montmorenci), Falls of: on the Montmorency river in Canada, near its mouth, about 8 m. from Quebec, near the little village of Montmorency. The river, 50 ft. wide, falls 250 ft.

MONTOJO, Patricio: Spanish naval officer: b. 1833. He entered the navy when a young man, and at the outbreak of the Spanish-American war was in command of the Spanish fleet in the Pacific. This force was attacked by the American Pacific squadron under Dewey in Manila Bay 1898, May 1. Montojo's flagship, the *Reina Christina,* was successively engaged by the *Olympia, Baltimore, Raleigh,* and *Boston,* received 70 shots, which killed 52 men and wounded 150; and finally caught fire. Montojo transferred his flag to a gunboat. In September 1899 he was court-martialed in Madrid; urged in his defense that the fault of the defeat was the Spanish government's, as it had not given him proper equipment; and was retired without right of promotion.

MONTPELIER, *mŏnt-pē'yėr,* or *mŏnt-pē'lĭ-ėr:* town, cap. Washington county, and of the state of Vermont; in the central part of the state, on the Winooski river, 40 miles from Burlington, about 200 miles northwest of Boston. It is in a beautiful valley on the Central V., the M. & B., and the M. and W. R. railroads, and has considerable trade with adja-

cent agricultural and dairy regions. It has six churches, good schools, is the seat of the Vt. Methodist Sem. and Female College, has the state library, a public reading-room, and two religious and three weekly secular papers and daily newspapers are issued during the legislative sessions. There are two banks, two fire insurance companies, one life insurance company, and four hotels. The state house, of granite in the Grecian-Doric architecture with dome 124 ft. high, is an admirable structure. The city is a summer resort. Pop. (1870) 3,023; (1880) 3,219; (1890) 4,160; (1900) 6,266.

MONTPELLIER, *mōng-pā-lyā'* (Lat. *Mons pessulanus* or *puellarum*); city of France, dept. of Hérault; 43° 36′ n. lat., and 3° 50′ e. long; about 480 m. s. of Paris, 7 m. from the Mediterranean. Seen from a distance, M. has an imposing appearance, from the number of its towers, steeples, and cupolas; but though its suburbs and the newer parts of the city are clean and well built, the interior of the old town disappoints expectation, being remarkable chiefly for its crooked, dark, narrow, and dirty streets, though it has many good houses. The public walks, especially the Place de Peyrou, one of the finest squares in France (575 ft. long, 410 ft. wide), and some other elevated points, afford superb views, embracing the Mediterranean, the Alps, the Cevennes, and the Pyrenees. The most noteworthy buildings are the cathedral, the theatre, the exchange, the Hall of Justice, the prefecture, the observatory, and the university. The university, founded 1196, is composed of three faculties—medicine, founded 12th c. by Arabian physicians, and still ranking among the best in Europe—exact sciences—and physical sciences. M. has a botanical garden, the oldest in Europe; a public library of 50,000 vols., and a pharmaceutical school; admirable museums, natural history and fine art collections, etc. The industrial products of M. are pigments and other chemical preparations, brandy, liqueurs, perfumes, soap, corks, sugar, cotton, woolen, and fine leather goods; and the trade, which is very important, includes, besides these articles, wine, seeds, olive oil, and fruits. Railways to Marseille, Cette, and other ports, besides various canals, facilitate commercial and social intercourse, and few cities of the empire hold out greater attractions in regard to intellectual culture. Its geographical position has led to its being selected as a place of residence for consumptive patients; but the extreme clearness, and even sharpness of the air in the more elevated parts of the town, the occurrence of the icy wind known as the *Mistral*, and the sudden accession of overpowering heats, seem materially to counteract some of its long reputed advantages. —Pop. (1886) 53,506; (1891) 69,258; (1901) 75,950.

MONTRE, n. *mŏngtr* [F.]: mounted diapason: an organ stop whose pipes form part of the case or are placed away from the sound-board—one of the foundation stops is generally used for this purpose.

MONTREAL, *mŏnt-rē-awl′:* largest city of the Dominion of Canada, in the province of Quebec; lat. 45° 31′ n.; long. 73° 35′ w.; 170 m. s. w. of Quebec, 986 m. from the Atlantic; 200 m. below Lake Ontario, 400 m. from New York.

Topography.—M. has a noble situation, being built on a succession of terraces on the side of Mount Royal which rises immediately behind the city to a height of 753 feet above sea-level. The city is built on the southeastern side of the island of Montreal at the confluence of the Ottawa and St. Lawrence rivers, and at a point where the Lachine Rapids make further navigation impossible. Upon three sides of the city the mountain ends in a sheer cliff, but on the western side it extends for three miles in broken ridges. The eastern suburb of M., called Hochelaga, was originally the site of an Indian village of the same name, discovered 1535, Sep., by Jacques Cartier; and it is from his admiring exclamation at the view from the neighboring hill that M. (corrupted from Mont Royal) derives its name.

Navigation, Commerce, Industries, Etc.—By the deepening of the shallower parts of the river above Quebec, M. is now accessible to vessels of over 3,000 tons' burden, and drawing 19 to 22 ft. Its harbor, lined with wharves for a mile and a quarter, at which 125 ships can lie at one time, is, from its inland position (90 m. above the influence of the tides), perfectly safe. Situated at the head of the ocean navigation of the St. Lawrence, M. has naturally become the depot for the exports and imports of all the Canadas. At the same time, the obstruction to vessels sailing further up the river, caused by the rapids, has been surmounted by magnificent canals. The Lachine Canal avoids the Lachine Rapids (see St. Louis, Lake), and simplifies direct communication with Lake Ontario, which is accessible from Ottawa by the Rideau river and canal. The Welland Canal, passing around Niagara Falls, connects Lakes Ontario and Erie; so that M. is at the foot of an improved chain of inland waters extending to Lake Superior. The canals connecting M. with Lake Ontario have locks of 200 ft. by 45, with 9 ft. of water on the sills; the locks of Welland Canal are rather smaller. By means of the Ottawa, M. is in contact with the vast lumber-country adjoining that river and its tributaries. While navigation is open, an extensive daily traffic is carried on by steamers and sailing-vessels of every description, with Lake Ontario and the Ottawa district, as well as with the lower St. Lawrence; and the ships of the Montreal Ocean Steamship Company, by aid of a subsidy from the Canadian govt., keep up weekly communication with Liverpool, and the harbor is constantly crowded with vessels from other foreign ports. After the navigation of the St. Lawrence is closed, the ocean steamers find a harbor at Portland, Me., connected with M. by a railway of 292 m. This line belongs to the Grand Trunk railway company, and crosses the St. Lawrence at M. by the celebrated tubular Victoria Bridge, the length of which, including its two abutments and 24 piers, is more than a mile and three-quarters. By

the lines of the same company and also by the Canadian Pacific, M. has railway communication with upper Canada, the western states, and lower Canada, while the intercolonial railway gives communication with Halifax and St. John. Several other lines afford direct communication with all the important cities and towns in New England and N. Y. The position, therefore, of M., as a centre of commerce, is scarcely surpassed, and its rapid advance in consequence has placed it, within the last few years, among leading commercial cities of the American continent. The development of Manitoba and the Canadian northwest, and the progress of the Canadian Pacific railway, tend to increase its commercial importance. In 1904-5 the imports were valued at $78,451,031; the exports at $59,411,278; the customs dues totalled $11,591,656. The harbor is open on an average about eight months, from the latter half of Apr. to the beginning of Dec. The manufactures of M. are considerable, the principal being boots and shoes, tobacco, cotton, locomotives, passenger and freight cars, saws and axes, steam-engines, type, India-rubber shoes, paper, furniture, woolens, cordage, and flour.

Public Buildings, Hospitals, Etc.—The public buildings of M. are numerous and handsome. Among them are Bonsecours Market, Courthouse, City Hall, Bank of M., the Art Gallery, the Fraser Public Library with 30,000 volumes, the Canadian Pacific Railway station, the Windsor Hotel, etc. Many of the private residences are magnificent. Among the hospitals are the Hotel Dieu, the M. General, the Royal Victoria, the Notre Dame, the Western General, the Alexandra and the enormous hospital of the *soeurs grises* for foundlings and the aged infirm. M. contains many fine parks and monuments, chief of which are the Viger Gardens, Logan and Mount Royal parks, the Place d' Armies with the bronze statue of Maisonneuve, founder of Montreal; Jacques Cartier Square, with a column and statue of Lord Nelson; Victoria Square with a bronze statute of Queen Victoria; and Dominion Square where there are the statue of Sir John A. Macdonald and the ice palaces erected when Carnival was king.

Churches, Educational Institutions, Etc.—It is for the size and magnificence of its churches that M. is most remarkable. The huge Rom. Cath. Cathedral of St. James (erroneously called St. Peter) is after the plan of St. Peter's at Rome; it is 300 ft. long by 225 wide at the transepts, and is crowned by five domes, one of them 250 ft. high. Though smaller than this, the Church of Notre Dame, hitherto serving as cathedral, is also a very large building. Built in the Gothic style of the 13th c., it can accommodate between 10,000 and 12,000 people. It has six towers, of which the three on the main front are 220 ft. in height; and its chief window is 64 ft. high and 32 broad. Adjoining the cathedral is the Seminary of St. Sulpice, to which a large addition has been built within the last few years at a cost of $40,000. There are several other Rom.

CHURCH OF NOTRE DAME, MONTREAL.

Cath. churches among which are Notre-Dame de Lourdes, Notre-Dame-de-Bonsecours, and the Church of the Gesu, with St. Mary's College adjoining. The city contains some of the largest conventual establishments in the world. The general wealth, indeed, of the Rom. Cath. Church in M. has grown enormously in consequence of the increased value of the property given to it during the early settlements of the French. The Church of England has several fine structures, notably the Anglican Christ Church Cathedral, St. George's church, and the church of St. James the Apostle. The principal Presbyterian churches are St. Andrew's (Church of Scotland) a chaste Gothic structure, St. Paul's, Knox, American, Crescent and Erskine churches. St. James, a handsome structure in florid Gothic, is the chief of the Methodist churches. M. is the seat of both Rom. Cath. and Anglican bishops. The educational institutions include McGill University (non-denominational, founded 1821) with which are connected the Presbyterian, Wesleyan, Anglican, Diocesan, and Congregational Colleges; the Medical Faculty of Bishop's College, Lennoxville; a branch of Laval University (Rom. Cath. established in M. in 1877); the Seminary of St. Sulpice, St. Mary's College, and the establishments conducted by the Sisters of the Congregation of Notre Dame and the Sisters of the Holy Names of Jesus and Mary. Public instruction is free; the public schools are controlled by boards of commissioners, one for Catholics and one for Protestants, elected by the legislature and city council.

Government, Finance, Banking, Etc.—The city government is vested in a mayor and a council of 36 aldermen, elected every two years. The assessed valuation of property in 1904-5 was $206,856,475; the net public debt was $27,000,000. The civic income in 1903 was $3,554,428; the expenditures included interest charges $1,089,531, schools $355,000, and general administration $2,401,843. In addition to this there was a water tax of $707,694. There are a number of bank branches in M. and one—the Bank of Montreal—has its headquarters there with a capital of $14,400,000 (Dec. 31, 1906) and a reserve fund of $11,000,000. The total bank clearings during 1905 amounted to $1,326,257,000. M. is supplied with water by works which cost about $600,000; the water is brought from the St. Lawrence above the Lachine Rapids, by an aqueduct five m. long, to a pond, from which it is forced up, by power derived from part of its surplus waters, into reservoirs capable of containing 20 millions of gallons, 200 ft. above the river.

History.—The history of M. dates from 1535 when Jacques Cartier visited the island and found a town named Hochelaga situated about a league distant inland. On the 28th of May, 1611, Samuel de Champlain landed at a place which he named Place Royale. The actual founding of the present city, however, dates from 1642, May 18, when Paul de Chomedy, Sieur de Maisonneuve arrived with

a party of colonists at the foot of St. Mary's current and founded the *Ville Marie-de-Montréal.* The town was engaged for many years in combating the depredations of the Iroquois, but in 1665 their power was broken by the French and but one massacre of any magnitude occurred thereafter. This occurred at Lachine on August 4, 1689, when a number of settlers were killed and 200 captured by a band of 1,500 Iroquois. M. remained under French control until 1760, when, Quebec having been captured the year before and the British being in full control of the St. Lawrence, the city was forced to capitulate to Gen. Amherst on Sept. 8. During the American revolution M. was attacked by troops from the colonies under Brig.-Gen. Wooster, and Gen. Carleton retired to Quebec, the city remaining in possession of the colonists during 1775-6. At this time an attempt was made by the American commissioners under Franklin to detach Canada from its allegiance to England, but the scheme failed and in 1776 the American troops retreated. M. obtained its first city charter in 1833, became the seat of the Canadian government in 1844 but in 1849, when the Parliament buildings were destroyed by a mob who had become enraged at the passage of the "Rebellion Losses Bill," by which, as they conceived, actual rebels were to be compensated for losses they had sustained, the government was removed to Toronto. The greatest disaster which the city has suffered was the conflagration of 1901 when a large portion of the commercial district was destroyed, involving a loss of $4,000,000. The population of Montreal in 1901 was 266,826 but, including the suburbs, it is now estimated at 375,000, of whom 225,000 are French and the remainder of Irish, English and Scottish descent. For the early history of M. consult Maclennan, *Montreal and Some of the Makers Thereof* (Montreal, 1893); Sandham, *Ville Marie,* or, *Sketches of Montreal Past and Present* (Montreal, 1870); and the authorities cited under CANADA.

MONTREAL' ISLAND: large and fertile island on which the city of Montreal is built; 30 m. long, 10 m. greatest breadth; 197 sq. m. Formed by the separation of the two channels by which the Ottawa issues into the St. Lawrence, its surface, except at Mount Royal, is diversified only by gentle undulations.

MONTRESOR, *mŏn-trĕs'ĕr,* FRANCES FREDRICA, English novelist: b. near Walmer, Kent. She is a daughter of Admiral Montresor, and among her books, which have had a vogue in this country as well as in England, are: *Into the Highways and Hedges* (1895); *The One Who Looked On* (1895); *Worth While* (1896); *False Coin or True* (1896); *At the Cross Roads* (1897); *The Alien* (1901).

MONTREUX, *mōng-trĕh':* village on the n. shore of the Lake of Geneva, 14 m. s.e. of Lausanne. Its beautiful situation and mild climate and high repute for healthfulness attract many visitors, and the place abounds with *pensions.* There are several other villages (among them, Clarens) in the commune of M.—Pop. of commune abt. 8,000.

PANORAMA OF MONTREAL, FROM MOUNT ROYAL.

MONTROSE, *mōn-trōz':* royal and parliamentary borough and seaport on the n.e. coast of Scotland, county of Forfar; at the mouth of the river South Esk, about 80 m. n.e. of Edinburgh, 40 m. s. of Aberdeen. It stands on a level peninsula between Montrose Basin (a tidal loch, 7 m. in circumference, but almost dry at low water) and the mouth of the river South Esk. A fine suspension-bridge, 432 ft. long and 26 ft. broad—erected 1828-9 at a cost of nearly £23,000—connects the town with Rossie Island, which is again connected with the mainland by a small drawbridge. The Royal Lunatic Asylum, opened 1868, accommodates about 400 patients. Between the town and the shore are the 'Links' or downs, among the finest in Scotland for golfing or cricketing. The harbor, one of the best on the e. coast, affords excellent accommodation to vessels of large tonnage, having 18 ft. of water on the bar at low-water of spring-tides. Two light-houses stand in line on the n. bank of the river, about 400 yards apart, while a tower, named the Scurdyness Light-house, erected by the board of trade 1870—exhibiting a clear white light, visible at nearly 20 m. distant—stands at the mouth of the river. Flax-spinning is the chief manufacture. A large saw-mill employs nearly 300 men and boys. There are good schools, an academy, and a public library of about 20,000 vols. Imports—coal, lime, slate, iron, flax, and manures; exports—manufactured goods, salmon, herring, dressed wood, and agricultural produce. Pop. about 13,000.

MONTROSE', JAMES GRAHAM, first Marquis of and fifth Earl of: 1612-1650, May 21; b. at Old Montrose, near Montrose town; of a family that can be traced back as far as 1128.—Its first notable member was Sir JOHN GRÆME of Dundaff, who fell at the battle of Falkirk, 1298, July 22. Early in the 15th century, Sir William Graham married for his second wife a daughter of King Robert III. ROBERT, eldest son of this marriage, was ancestor of the Grahams of Claverhouse. The third Lord Graham, created Earl of Montrose by James IV., fell at Flodden; his eldest son at Pinkie. The next in succession became viceroy of Scotland after James VI. had ascended the throne of England. His eldest son, John, who succeeded to the earldom 1616, married Lady Margaret Ruthven, eldest daughter of William, first Earl of Gowrie, and sister of the unfortunate nobleman who gives name to the *Gowrie Conspiracy.* The issue of this union was five daughters and one son, James Graham, the 'great Marquis,' subject of this sketch.

Montrose's mother died 1618, his father 1626. In the following year the boy was sent to the University of St. Andrews by his guardian and brother-in-law, Archibald, Lord Napier, son of the famous inventor of logarithms. During the two or three sessions of his attendance at college,

M. showed a genuine predilection for literature, which the stormy character of his after-life never quite destroyed. In his 17th year he married Magdalene Carnegie, daughter of Lord Carnegie of Kinnaird, Earl of Southesk. On attaining his majority, he left Scotland, to travel on the continent, visited the academies of France and Italy, and perfected himself in the accomplishments of a gentleman and a soldier. On his return, he was introduced to King Charles I., but, owing, it is said, to the machinations of the Marquis of Hamilton, was coldly received by that monarch, and thereafter, soon as he reached Scotland, joined the ranks of the king's opponents—at that period the majority of Scotchmen. M. came back in the very year (1637) when the tumults broke out in Edinburgh on the attempt to introduce the Prayer-book. Whether his conduct at this moment was the result of chagrin, or whether he was carried away by the prevailing enthusiasm, or by the persuasions of craftier persons than himself, is difficult to say. At any rate, the youthful nobleman soon became to appearance one of the most zealous of the Covenanting lords. He was one of the four noblemen selected to compose the 'Table' of the nobility, which, with the other Tables of the gentry, of the boroughs, and of the ministers, drew up the famous National Covenant (see COVENANTS), sworn to by all ranks at Edinburgh in the spring of 1638. In 1639 he made three military expeditions to Aberdeenshire to overawe the royalists; and he twice took the city of Aberdeen. On the first occasion (Mar. 29), he compelled the inhabitants to subscribe the Covenant, but did no injury to the city. His 'too great' humanity is even lamented by Baillie. On the second (May 25), he imposed on the city a fine of 10,000 merks; but though his soldiers pillaged the place, he honorably resisted the importunities of the zealots among the Presb. clergy, who wished to expose it to the horrors of conflagration. Baillie again complains of his 'too great lenity in sparing the enemy's houses.' The arrival at Aberdeen, by sea, of the Earl of Aboyne—Charles's lieutenant of the north—with some reinforcements, induced M. to retreat: he was pursued by the earl and the Gordon Highlanders; and in a battle June 15 at Meagra Hill, near Stonehaven, M. obtained a complete victory. Four days later, he was again master of Aberdeen, after a fierce struggle at the passage of the Dee. The citizens were stricken with alarm, expecting some bloody punishment for their well-known leanings toward prelacy, but M. agreeably disappointed their fears. At a subsequent period, he was upbraided by the Committee of Estates for not having burned the town on this occasion. News of 'the pacification of Berwick' now arrived in Aberdeen, and terminated the struggle in the north. Charles, who was noted for his fascinating power in conversation, invited several of the Covenanting nobles to meet him at Berwick, where he was holding his court, and to consult with him about Scottish affairs. Among those who went was M., and

from that interview the Scotch Presbyterians dated what they regarded as his apostasy. Be that as it may, his political position was certainly different after his return. In the general assembly which met 1639, Aug. 13, under the presidency of the Earl of Traquair, as royal commissioner, he showed symptoms of disaffection toward the Covenant, and was the object of popular obloquy. One night he is said to have found affixed upon his chamber-door a paper bearing these words, *Invictus armis, verbis vincitur.* The dissolution of the parliament 1640, June, led to an open rupture between the king and the Covenanters, and both parties prepared to decide their quarrel by force of arms. The king assembled at York an army of 21,000 horse and foot; the Covenanters one of 26,000, which, under the command of Leslie, crossed the Tweed 1640, Aug. 21, M. being the first man that forded the stream. The successes of the Scots soon forced Charles to summon a new parliament for settlement of national grievances. Meanwhile M., with several other nobles, had entered into a secret engagement at Cumbernauld, for the purpose of frustrating what they regarded as the factious designs of the extreme Presb. leaders. His conduct in England, too, had been suspicious. It was accidentally discovered that he had been secretly communicating with the king; and when the parliament assembled (1640, Nov.), he was cited to appear before a committee. The affair of the *Cumbernauld Bond*, discovered by the ingenuity of Argyle, was brought up; but M. defended his conduct and that of his colleagues; and nothing came of it, though some fiery spirits among the clergy, says Guthrie, 'pressed that their lives might go for it.' In the following June, M. and some others were accused of plotting against Argyle, and were confined in Edinburgh Castle, where they remained till the beginning of 1642, when they were set at liberty in return for the concessions which Charles had made his Scottish subjects. Although they had been frequently examined, nothing definite had been proved against them. The accusation that M. had offered to the king to assassinate Argyle is not historically substantiated, and is intrinsically improbable. During the next two or three years he kept aloof, outwardly, from public affairs, but he had finally broken with the Covenanters, and had privately ranged himself on the side of the king. Indeed, M. had no natural inclination toward Puritanism, and cared little for the ecclesiastical questions involved in the quarrel. As he had opposed the outrageous intermeddling of the crown with the liberties of Scotchmen in their Presb. worship, so now he opposed the harsh, almost insolent control which the Presb. clergy claimed over the laity. The civil war in England had now broken out, and was being carried on with dubious success. Charles and his advisers resolved to crush the Presb. leaders in Scotland, who were abetting the efforts of the English parliamentarians. In the spring of 1644, M., now raised to the rank of marquis, left Oxford, where he had been residing

with his sovereign, and proceeded to Scotland to raise the royalists in the north. The battle of Marston Moor for a moment paralyzed him, but his resolution speedily returned. He threw himself into the Highlands, and, after skulking about the hills in disguise, met at Blair-Athol some Irish auxiliaries and a body of Highlanders under Allaster Maccoll Keitache Macdonald, better known as *Colkitto*, who had forced their way thither from the Western Isles in hopes of joining him. M. instantly placed himself at their head, and the clans quickly rallied round his standard. Marching s., he fell suddenly (Sep. 1) on the Covenanting army commanded by Lord Elcho, at Tippermuir, near Perth, and gained a complete victory: not a single royalist was slain. The same night, M. entered Perth, where he remained three days, levying a fine of 9,000 merks on the inhabitants. He then set out for the n., defeated a force of Covenanters under Lord Burleigh at Aberdeen (Sep. 13), and took possession of the city, which was abandoned for four days to all the horrors of war. The approach of Argyle, at the head of 4,000 men, compelled M., whose forces were far inferior in numbers and discipline, to retreat. He plunged into the wilds of Badenoch, recrossed the Grampians, and suddenly appeared in Angus, where he wasted the estates of more than one Covenanting nobleman. Argyle, baffled in his attempts to capture or crush M., returned to Edinburgh, and threw up his commission. His opponent, receiving large accessions from the Highland clans, planned a winter campaign, marched s.w. into the country of the Campbells, devastated it frightfully, drove Argyle himself from his castle at Inverary, and then wheeled north, intending to attack Inverness, where the Covenanters were posted in force under the Earl of Seaforth. The 'Estates' at Edinburgh were greatly alarmed, and, raising a fresh army, placed it under the command of General Baillie, natural son of Sir William Baillie of Lamington. After consulting with Argyle, it was arranged that he should proceed by way of Perth, and take M. in front, while Argyle should rally his great array of vassals, and attack him in the rear. The royalist leader was in the great glen of Albin—the basin of the Caledonian Canal—on his way to Inverness, when he heard that Argyle was following him. He instantly turned on his pursuer, fell upon him unexpectedly at Inverlochy 1645, Feb. 2, and utterly routed his forces: 1,500 of the Campbells were slain, and only four of M.'s men. He then resumed his march northward, but did not venture to assault Inverness—his wild mountaineers being admirably fitted for rapid irregular warfare, but not for the slow work of beleaguerment. Directing his course to the e., he passed —with fire and sword—through Elgin and Banff into Aberdeenshire, which suffered a similar fate, captured and pillaged the city of Dundee (Apr. 3), and escaped safely into the Grampians. May 4, he attacked and routed Hurry at Auldearn, near Nairn; and soon again issued from his wilds, and inflicted a still more disas-

trous defeat on Baillie himself, at Alford, in Aberdeenshire (July 2). There was now nothing to prevent his marchs., and about the end of the month he set out with a force of 5,000 to 6,000 men. He was followed by Baillie, who picked up reinforcements on his way, and Aug. 15 again risked a battle at Kilsyth, but was defeated with frightful loss—6,000 of the Covenanters being slain. The cause of Charles was for the moment triumphant; M. was virtually master of the country. The king formally appointed him lieut.gov. of Scotland and commander-in-chief of the royal forces. All the principal cities in the west hastened to proclaim their fidelity, and laid the blame of the recent troubles on the unfortunate Presb. clergy. But affairs soon took a very different turn. Great numbers of the Highlanders returned home —we might even say, deserted—burdened with multifarious plunder; and the Earl of Aboyne withdrew with all his cavalry. M.'s position, in a district teeming with enemies, was growing critical, and Sep. 4 he broke camp at Bothwell, and marched for the eastern counties, where Charles had informed him that the Earls of Traquair, Home, and Roxburgh were ready to join him. In this he was disappointed, and Sep. 13 he was surprised at Philiphaugh, near Selkirk, by David Leslie, who fell upon the relics of M.'s army and his raw levies with 6,000 cavalry—the flower of the Scottish forces then serving in England—who had been hurriedly dispatched home on the news of M.'s startling successes. Leslie completely annihilated his opponent. 'On Philiphaugh,' says Sir W. Scott, 'M. lost the fruit of six splendid victories.' Escaping from the field of battle, he made his way to Athol, and again endeavored, but in vain, to rouse the Highlands; and at last Charles, whose cause now began to decline in the civil war, was induced to order him to withdraw from the kingdom. 1646, Sep. 3, he sailed for Norway, whence he proceeded to Paris. Here he endeavored, but in vain, to induce Henrietta Maria to bestir herself on behalf of her husband. The queen coldly received all his suggestions, and at last M., in despair, betook himself to Germany, in hope of service under the emperor, but soon returned to Holland, and entered into communications with the Prince of Wales, afterward Charles II. It was here that news of the beheading of Charles I. reached him: M. fainted on receipt of the dreadful intelligence, and gave way to the most passionate regrets. Charles II. now re-invested him with the dignity of lieut.gov. of Scotland, and M. undertook a fresh invasion on behalf of the exiled monarch. 1650, March, he arrived at the Orkneys with a small force, and after the lapse of three weeks proceeded to Caithness; but neither the gentlemen nor the commons would rise at his call. He forced his way as far s. as the borders of Ross-shire, where his dispirited troops were attacked and cut to pieces at a place called Corbiesdale, near the pass of Invercarron, by a powerful body of cavalry under Col. Strachan. M. fled into the wilds

of Assynt, where he was nearly starved to death, when he fell into the hands of M'Leod of Assynt, who delivered him up to Gen. Leslie, by whom he was brought to Edinburgh. Condemned to death as a traitor to the Covenant which he had signed, he was hanged. His demeanor in his last moments was noble and dignified. He declared that he was still a Covenanter; that he did not care for bishops, and had never intended to advance their interests.

MONTSERRAT, *mŏnt-sĕr-răt':* one of the Lesser Antilles, belonging to Britain, 43 m. n.w. of Guadeloupe, and about the same distance from Antigua and St. Kitts. It is about 11 m. in length, 7 in breadth; 32 English sq. m. About two-thirds of the surface is mountainous and barren; the rest is well cultivated. The chief products are sugar, limes, rum, and molasses; but cotton, arrow-root, and tamarinds also are exported. The island forms a portion of the government of the Leeward Isles, and is directly ruled by a president, aided by a council and house of assembly. The chief town is Plymouth, on the s. coast. Pop. over 12,000.

MONTSERRAT, *mont-sĕr-rât'* (Lat. *Mons Serratus,* from having jagged ridges *like the teeth of a saw*): mountain of Catalonia, in n.e. Spain, about 30 m. from Barcelona; height 3,919 ft. 'Its outline,' says Ford (*Handbook for Spain,* I. 419), 'is most fantastic, consisting of cones, pyramids, buttresses, nine-pins, sugar-loaves, which are here jumbled by nature in a sportive mood.' The pious Catalonians aver that it was thus riven and shattered at the Crucifixion. Every rift and gorge is filled with box-trees, ivy, and other evergreens. From the topmost height, the eye wanders over all Catalonia, and from the sea the ridge looks like an immense wall with seven pyramidal peaks. The mountain, however, owes its fame not to its extraordinary appearance, but to the Benedictine Abbey built upon it, at an elevation of 1,200 ft., and to the 13 hermitages formerly perched like eagles' nests on almost inaccessible pinnacles. In 1811 the French, under Suchet, plundered the abbey, burned the library, shot the hermits, and hung the monks (who had given shelter to their emigrant brethren at the Revolution). The place suffered still more 1827, when it became the stronghold of the Carlist insurrection.

MONUMENT, n. *mŏn'ū-mĕnt* [F. *monument*—from L. *monŭmen'tum,* a memorial—from *monĕō,* I admonish or remind: It. *monumento*]: anything durable made or erected to perpetuate the remembrance of any person or thing; a structure, as a pillar or mausoleum, erected as a memorial; a tomb; any enduring evidence or example, as a *monument* of folly or wisdom. MON'UMENT'AL, a. *-mĕnt'ăl* [F.]: of or relating to a tomb or monument; memorial; preserving memory. MON'UMENT'ALLY, ad. *-lĭ.*—SYN. of 'monument': cenotaph; memorial; remem-

brance. See CAIRN; CROMLECH; SEPULCHRAL MOUND; PILLAR; OBELISK; PYRAMID; ARCH, TRIUMPHAL; BRASSES, SEPULCHRAL; TOMB; TOPE; MAUSOLEUM; etc.

MONUMENTUM ANCYRANUM: an inscription on the marble walls of the temple of Augustus at Ancyra (modern Angora) in Galatia. It is a transcript in both Greek and Latin of the emperor's own account of his reign, which he had ordered in his will to be set up on bronze tablets before his mausoleum in Rome. Though in fragmentary condition, it is of high historical value.

MONVEL, LOUIS MAURICE BOUTET DE: French painter and illustrator: b. Orleans 1850. He studied with Rudder, Cabanal, and Carolus Duran, with the last, after some work in the Atelier Julien. His first picture exhibited in the Salon appeared in 1874. He prefers the decorative to the realistic effect in color and modeling. The illustrations which he made for the *Life of Jeanne d'Arc* (1897) in the *Century Magazine* are supremely successful both in line and color. In the Memorial Church at Domrémy he has painted six panels illustrating the career of La Pucelle. Among his best known pictures is *The Apotheosis* (1885), and his portraits are famous.

MONZA, *mōn'zâ* (anc. *modætia*): chief town of a dist. in the province of Milan; on the river Lambro, 10 m. n.n.e. of Milan, with which it is connected by railway. It is essentially a town of Lombard growth, and under the Lombard sovereigns was capital of their kingdom. It owes much of its early importance, and its chief public edifices, to Theodolinda, the great queen of the Lombard dynasty. In the middle ages Monza was conspicuous for the wealth of its numerous citizens and nobles, and the extent of its cloth-trade. It has undergone 32 sieges. The cathedral, founded in the 6th century by Theodolinda, contains many interesting memorials of this great queen. The famous Iron Crown (q.v.) and regalia of Lombardy, employed at the coronation of the German emperors as kings of Italy, were removed from Lombardy by the Austrians 1859, on the cession of that province to France. The town has a good gymnasium, a theatre, two hospitals, and a philharmonic institution. Its manufactures of cottons, hats, and preserved meats are increasing. Monza is surrounded by an exuberantly fertile district, which yields abundance of grain, fruits, wine, and silk, and possesses great beauty of scenery and climate. Pop. 42,500.

MOOD, n. *môd* [Dut. *moed;* Ger. *muth;* Icel. *modr*, spirit, courage]: disposition of mind; temper of mind; a temporary state of the mind; disposition. MOODY, a. *môd'ĭ*, peevish; fretful; out of humor; sad; gloomy. MOOD'ILY, ad. *-lĭ*. MOOD'INESS, n. *-nĕs*, sullenness; peevishness.—SYN. of 'moody': pensive; capricious; varying; mournful; dejected; melancholy.

MOOD, n. *môd* [F. *mode*, fashion, way, mood in grammar—from L. *modus*, a measure, quantity (see MODE)]: in *gram.*, a certain form of inflection indicating the *mode* or *manner*, as regards action, in which the meaning of the verb is presented to the learner, as indicative *mood*, imperative *mood;* in *logic*, the form of a syllogism, as determined by the quantity and quality of its propositions; style of music.

MOOD: in logic, the specific form of a syllogism, dependent on the quantity and quality of its propositions. Classifying propositions as Universal Affirmative, 'A'; Universal Negative, 'E'; Particular Affirmative, 'I'; and Particular Negative, 'O,' the moods are the various possible combinations of 'A,' 'E,' 'I,' 'O,' in the premises of a syllogism. Combining A, E, I, O in pairs, we have sixteen possible moods. Seven of these are invalid, viz.: EE, EO, OE, and OO, since from two negative premises no conclusion can be drawn, and II, IO, OI, since from two particular premises no conclusion can be drawn. This leaves nine possible valid moods. Now, the validity of a syllogism depends also on the relations of subject, predicate and middle term in the premises. Since formal logic treats propositions primarily from the point of view of extension, the distribution of the terms involved must be taken into account. Let S represent subject, P predicate, and M middle or common term, which is the basis of inference. Then we have four figures: (1) M—P, S—M: S—P; (2) P—M, S—M: S—P; (3) M—P, M—S: S—P; (4) P—M, M—S: S—P. Each figure has special rules, which are derived from the particular arrangement of S, P, and M, in that figure. For example, in figure (1) the minor premise, S—M, must be affirmative, for, if it were negative, the conclusion would be negative, P would be distributed in it, and, since only negative propositions distribute their predicates and P must be distributed in the major premise M—P, the latter must be negative, and we would have two negative premises, which prove nothing; the major M—P must be universal, for M must be distributed at least once and it cannot be distributed in S—M, since it is here predicate of an affirmative proposition. By the application of the rules of each figure to the nine possible moods it is determined which are valid for each; e.g., in figure 1 these are AA, AE, AI, EI. See DISTRIBUTION (OF TERMS), and SYLLOGISM.

MOODIE, SUSANNA: English author: b. Suffolk, Eng., 1803; d. 1885. Sister of Mrs. Traill and Agnes Strickland; married J. W. D. Moodie of the 21st Fusiliers 1831; came to Canada 1832 and settled in the unbroken forest near the present Petersborough. Her works include: *Roughing it in the Bush; Flora Lindsay; Matrimonial Speculation; Life in the Clearings; Enthusiasms and other Poems; Mark Hurdlestone; The World Before Them.*

MOODIR, or MUDIR, n. *mô'dēr:* Turkish name for the governor of a city or district.

MOODY, *mô'dī,* DWIGHT LYMAN: evangelist: b. 1837, Feb. 5, Northfield, Mass.; d. there 1899, Dec. 22. When only four years of age he lost his father by death. He worked on a farm in summer and attended the country school in winter until he was 17 years old, when he became clerk in a shoe store owned by an uncle, in Boston. He attended the Mount Vernon Congl. Church and Sunday-school, and became a member of that church 1855. Under many discouragements he worked zealously in the church and Sunday-school. He went 1856 to Chicago, obtained a clerkship, and established a mission Sunday-school, which soon had 1,000 members. He relinquished his clerkship and devoted himself to study and religious work. He served the Christian Commission during the civil war, was then employed as city missionary by the Young Men's Christian Assoc. of Chicago, and subsequently became president of that organization. To meet the needs of his numerous converts, most of whom were gathered from classes outside of ordinary religious influences, an independent church was formed of which Moody, though not ordained, was pastor. In the great fire 1871, the church, with a house which had been presented to Moody, was destroyed, but a new church accommodating 2,500 persons took its place. At a convention of the Young Men's Christian Assoc. 1871 Moody met Ira D. Sankey, the famous singer, who joined him in his Chicago enterprise and frequently labored with him in evangelistic service. In 1873, June, Moody and Sankey commenced a series of meetings in the great cities of England, Scotland, and Ireland, which were attended with remarkable results. They returned 1875 and held meetings in many of the large cities of the United States, at which great numbers of people were converted. They visited Great Britain again 1883, returned the following year, and continued their labors in the same line with great success. Without abandoning entirely his evangelistic tours, he made Northfield his headquarters and established there a girls' academy (1879) and a training school for religious workers, and at Mount Hermon a boys' academy. Later he founded a school for Bible study in Chicago; and inaugurated the custom of holding, at Northfield, summer conferences of college students and missionary volunteers, and the annual meetings of the Young Men's and Young Women's Christian Associations. He also established systematic preaching and distribution of religious literature among inmates of the prisons; and built up at Chicago and Northfield establishments for the publishing of inexpensive religious books, tracts, etc. Moody was a close student of the Bible, exceedingly earnest and pungent in his preaching, yet noticeably broad and charitable in spirit. He was deeply versed in the Scriptures, had unfailing tact

and knowledge of men, and used language simple and unambitious, but of singular force and impressiveness. Among Moody's writings are: *How to Study the Bible; Men of the Bible; Weighed and Wanting; Arrows and Anecdotes* (1877); *The Way and the World* (1877); *Heaven* (1880); *Secret Power* (1881); *The Way to God* (1884); and *Bible Characters* (1888).

MOODY, HELEN WATTERSON: American author: b. Cleveland, Ohio. She was graduated from the University of Wooster, Ohio, in 1883, and was instructor in English and Latin there in 1883-7, when she became a member of the editorial staff of the New York *Sun*. She was married to W. S. Moody, a New York journalist, in 1891. She has published: *The Unquiet Sex* (1898); *A Child's Letters to Her Husband* (1903); etc.

MOODY, WILLIAM HENRY: American lawyer and politician: b. Newbury, Mass., 1853, Dec. 23. He was graduated from Harvard in 1876; studied law, and began the practice of his profession in Haverhill, Mass. He quickly attained success as a lawyer, was city solicitor for a time, and from 1890 to '95, district attorney for the eastern district of Massachusetts. In this position he showed himself an active, fearless prosecuting officer, notably in the case of certain aldermen of the city of Lawrence whom he convicted of receiving bribes and brought to punishment; he was also associated with the Massachusetts attorney-general as prosecuting attorney in the trial of Lizzie Borden for the murder of her parents. In 1895 he was unanimously nominated for congress by the Republicans, to fill a vacancy; he was elected at that time, and also to the three succeeding congresses. Through close study of the rules of the house he became distinguished as a parliamentarian, and was suggested as a possible candidate for speaker; he was a most active and efficient member of the committee on appropriations, and regularly had charge of the sundry civil appropriations bill, which he examined in detail; he was also appointed to the committee on insular affairs, and through his work on both these committees gained special knowledge of naval matters. In 1902 he was appointed secretary of the navy to succeed John D. Long; from 1904, July 1—1906, Dec. 16, was attorney-general of the United States; and since 1906, Dec. 17, has been associate justice of the supreme court of the United States.